THE MODEL ENGINEER

Vol. 104 No. 2593 THURSDAY FEB 1 1951 9d.

The MODEL ENGINEER

PERCIVAL MARSHALL & CO. LTD. 23, GREAT QUEEN ST., LONDON, W.C.2

1ST FEBRUARY 1951 VOL. 104 NO. 2593

SMOKE RINGS

Our Cover Picture

● WE PUBLISH a rather striking picture on our cover this week, and do not propose to make further comment on it, for the present. Meanwhile, we invite readers to give it a little thought and let us know what they think about it.

The "M.E." Exhibition, 1951

● READERS SHOULD make sure that they carefully note in their diaries the date of this year's MODEL ENGINEER Exhibition: August 22nd until September 1st. As usual, the venue will be the New Horticultural Hall, Greycoat Street, Westminster, London, S.W.1. Every effort is being made to ensure that the show shall be worthy of the Festival of Britain year; some important and entertaining novelties are being planned, and the competition section will, it is hoped, be bigger and better than ever.

Further announcements will appear in these columns as the various arrangements now being made are completed; so readers are asked to keep a careful watch on "Smoke Rings" during the coming months.

The First B.R. Standard Locomotive

● THE FIRST example of a British Railways standard locomotive type has just been completed. She is a large 4-6-2 type engine for mixed traffic, and is the first of an order for 25 now building; her number is 70000 and she is named *Britannia*.

In this issue will be found a drawing for a 3½-in. gauge edition of the new engine; this has been prepared by our good friend "L.B.S.C." to official particulars, and the little engine, which has been under construction for some time, is to be the subject of the new "serial" now ushered in. We have little doubt that our readers will be as much surprised as we are that this should have been possible so soon after the first public announcement of the new engines, since no information has hitherto been publicly released. But "L.B.S.C." usually has "something up his sleeve" and, in this case, he has sprung a pleasant surprise on us all. It is not the first time that he has been able to proceed with the construction of a new miniature locomotive at the same time as the full-size version was on the stocks.

Readers will notice that the new engine has several features which are common to *Tugboat Annie* and *Pamela*, and we do not think we are giving away a secret if we mention that Mr. R. A. Riddles, who is responsible for the design of the full-size *Britannia*, has shown considerable interest in both the small locomotives just mentioned.

Calling Mr. G. L. Hayes

● WE HAVE received a note from R. G. Harris, model engineers' supplier, of Cradley Heath, Staffs, to say that he recently dispatched a parcel of goods to Mr. G. L. Hayes, 12, North Road, Bransty. The parcel has been returned by the G.P.O. as being insufficiently addressed. Would Mr. Hayes please let Mr. Harris have his *full* postal address, so that the parcel can be delivered?

The "M.E." Diary Again

● WITH EASTER now some seven weeks ahead, outdoor activities, such as power boat regattas, locomotive and model racing car track meetings, as well as model engineering exhibitions, will be with us again from then onwards. The "M.E." Diary seems to have served a good purpose last year, in publishing brief announcements of forthcoming events, and we intend, therefore, to revive it this year. Will all club secretaries who would like to avail themselves of this service send us suitable announcements as far as possible ahead of the actual events? The particulars required are: Date, place and time of each event; we would emphasise, however, that for place it is not enough just to quote the name of the town, but the actual site on which the event is to be held. We would add that we make no charge for publishing these announcements.

The "M.E." Queries Service

● WE HAVE received many letters of appreciation from our readers regarding the practical advice given in our queries and replies service, on subjects which cover an extremely wide range; in some cases, well outside what may normally be called model engineering. In the great majority of cases we are able to answer queries by post within a few days, but there are occasions when considerable research work or reference is necessary, and in some cases the services of an outside consultant may be required. However, most of these queries are answered free of charge, but for special services it may be necessary to charge a fee, which is quoted before proceeding further. In view of the very large increase in the number of queries received, only a very small proportion of those dealt with are published in the pages alloted to them, but these are selected with a view to representing typical examples of queries. Some of the querists do not observe very closely the rules printed at the head of the "Queries and Replies" page, and we would particularly draw their attention to the necessity for each letter to be accompanied by a stamped addressed envelope. We wish to give the very best service to our readers and trust they will reciprocate by observing the rules strictly and stating all queries as concisely and accurately as possible.

American Model Racing Cars

● AN ILLUSTRATED "lecture" on model racing cars and American racing procedure has been compiled by Howard W. Frank, of New York, for exhibition at the various race car clubs and engineering societies in Great Britain.

The purpose of this lecture is to show and discuss the many features of model car racing as done in the U.S.A. with the thought in mind of assisting those interested in better performance and increased speed. There is no intent of criticism of British endeavour, but only to illustrate the technical data and "secrets" which enable Americans to attain 140 m.p.h. plus.

The subject matter covered in detail will be—track construction, U.S.A. racing rules, cars and component parts, engine modification for higher performance, fuels, tuning methods, racing operations, personalities, etc.

The sixty-odd photographs and drawings are presented in standard 2 in. × 2 in. glass mounted slides and will require the club to furnish a suitable projector (blower-cooled if possible) and a large viewing screen. Since each slide will have an accompanying text, each group should select a "narrator" who will take the place of the absentee Mr. Frank.

The material will be on loan to any responsible organisation for a showing, with dates now being scheduled by Mr. Ian (Bill) Moore, 2, Bridge Street, Derby. To make the scheduling easier for Mr. Moore, it is suggested that alternate dates be requested by club secretaries, allowing sufficient time between showings to cover any contingency of letter posting from one club to the next. A stamped addressed envelope will bring further details from Mr. Moore.

Portable and Other Engines

● MR. B. L. ROBERTS, of Llanllyfni, writing with reference to Mr. Andrew Todd's article in our December 28th issue, thinks that possibly Mr. Todd does not know the Nantlle Valley in Caernarvonshire. Mr. Roberts lives in the district and he states that, at Talysarn, there are to be found many fine old steam engines, built by the defunct firm of De Winton, working side-by-side with modern petrol, diesel and electric plants. The place is an extensive quarrying area.

At the Dorothea Quarries there is a fine Cornish pumping engine about 50 years old, working every day. It is in fine order and pumps water out of the quarry pit at the rate of about one ton per stroke. At the same quarry there are winding engines between 70 and 90 years old, huge diesel generating plants, small narrow-gauge locomotives, petrol dumpers, steam and diesel excavators.

At the Penbryn Quarry, the visitor will find an old beam engine lying derelict in its shed.

Many visitors go to these quarries every summer, to look at the engines and quarry-pits which are about half a mile deep. The machines cutting and dressing the slates from the raw rock, and men doing the same job with hand-knives are always a source of interest. Permission is given to look over the quarries while the men are at work. About two miles away is an old wool mill with ancient machinery driven by a water-wheel, turning out fine woollen materials.

Progress at Dover

● MR. H. E. Q. TURNER, hon. secretary of the Dover and District Model Engineering Society, informs us that the society has now passed the initial stages of formation and, having hired premises which contain a limited amount of equipment, is now prepared to cater for the needs of present and prospective members.

Very unfortunately, a severe loss was sustained by the death of Mr. W. Dean, the chairman, who was a great help to everybody concerned during the formation stage of the society. We hope, however, that now that the new society is firmly established, it will have the support of all "M.E." readers in the district. Mr. Turner's address is: 62, Markland Road, Dover.

The "M.E." Speed-Boat Competition—1950

THE story of progress in any field of human endeavour invariably discloses many struggles against difficulties, the scaling of barriers and surmounting of obstacles, and dogged perseverance in face of hazards, mishaps and disappointments. In this respect, the chronicles of model speed boat development which have been published in THE MODEL ENGINEER over a period of more than 40 years certainly run true to form. These years have seen the rise and decline of many cults in the design of hulls and power plants, the shattering of fallacies, and the meteoric career of champions, though many of the latter have in the course of time become eclipsed or faded out. All these factors, however, have contributed their quota to progress, and as the annual records of the "M.E." Speed-Boat Competition testify, the result has been a steady rise in the performance of boats, which has been maintained in spite of all the disruptions encountered by wars and their aftermath.

The 1950 competition, though by no means so well supported by entries as it should be, is yet sufficiently representative of current tendencies and performances to show that so far there is no sign of a decline in the rate of general progress, or in the popularity of the model speed boat among enterprising experimenters. Most of the boats featured in this competition are well known to readers interested in this branch of activity, and have been seen at several regattas in the past season; but there are many other boats to which this equally applies, which for some reason or another have not been entered.

In every competition, there must necessarily and obviously be some disappointed entrants; but more disgruntled still are the eligible candidates who forget, or otherwise neglect, to send in their entries. There is reason to believe that many exponents of model speed boats do not enter this competition because they think they do not stand a chance—that the results are already a foregone conclusion. One might, while conceding this view, criticise the attitude from the aspect of sportsmanship; but the fact is that the premise is by no means invariably correct, and the published competition results often contain some surprises. There have in the past been many "dark horses" which have upset the form calculations of those who believed themselves to be fully in touch with events. In this year's competition, there is at least one newcomer whose debut has been, to say the least of it, highly successful.

Hull Design

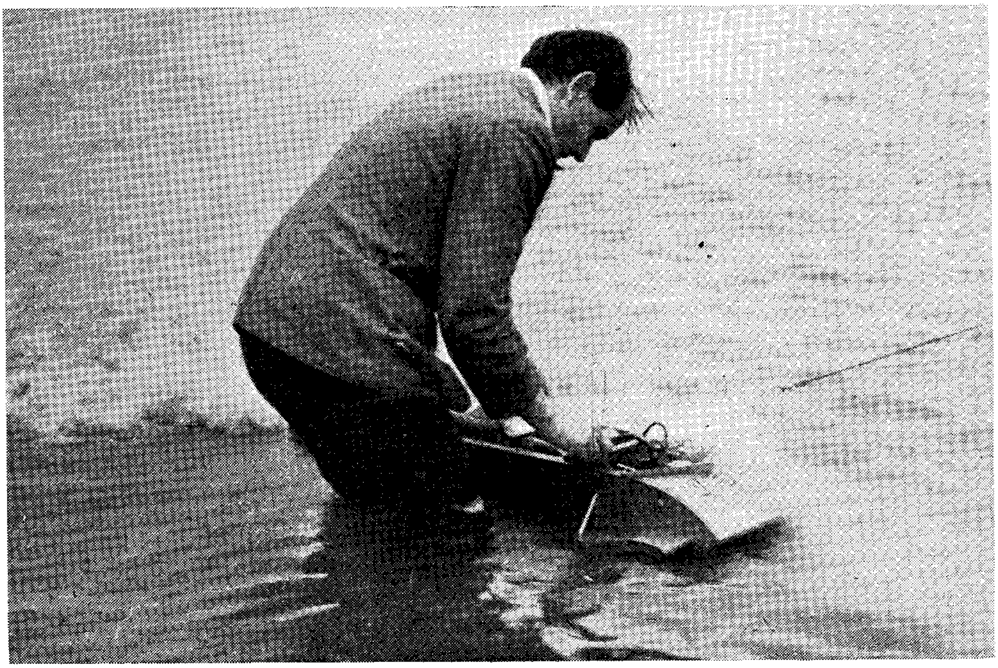
The older traditions in hull design seem to have been completely discarded in all boats which have been produced since the war; these invariably incorporate the modern features of the divided front plane, in one or other of its forms, and the surface propeller. That the older type of hull is by no means completely outdated, however, is proved by the veteran *Faro*, which though built long before the war, has completely kept pace with modern progress, and during the last season, has added still further to past achievements.

Another modern tendency is the decline in the popularity of the larger classes of boats, in favour of those of medium or small sizes. This is more or less a natural development, due in no small measure to the improvement in the efficiency of small engines, and the greater portability of small hulls. It may be, also, that the difficulty of obtaining timber for hull construction has had some slight influence on the choice of hull size.

Mr. K. G. Williams with "Faro" and one of the many trophies it has won

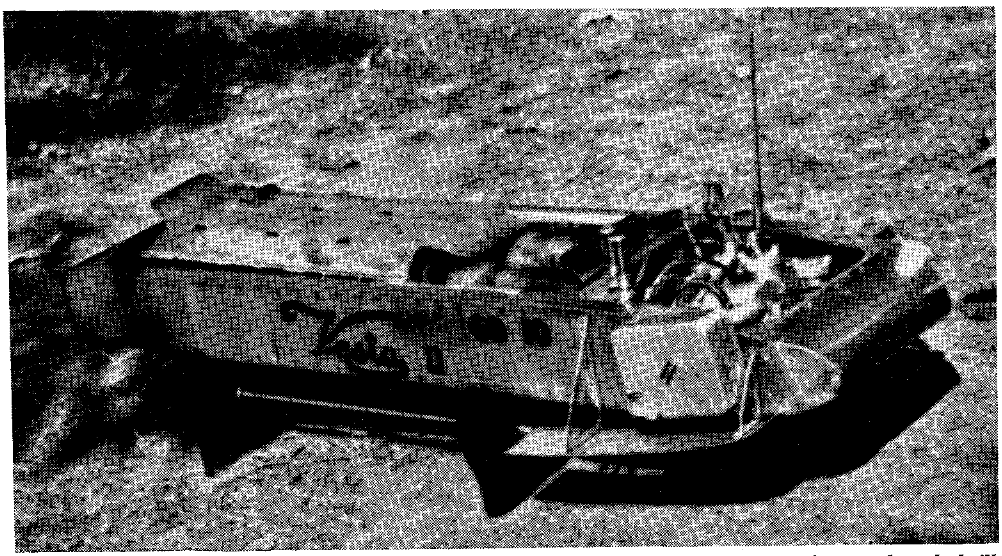
"M.E." SPEED-BOAT COMPETITION, 1950, RESULTS

Name of Boat	Owner	Total Weight lb.	Engine				Hull			Propeller					Speed m.p.h.
			Cyls.	Type	Bore	Stroke	Length	Max. Beam	Steps	No.	Dia.	Pitch	Blade area sq. in.	Blades	
			Class "A" (i.c.)												
Faro ..	K. G. Williams	14	1	4-str.	$1\frac{5}{16}$	$1\frac{5}{16}$	40	12	1	1	3	6	1.84	2	58.8
Beta II ..	R. E. Mitchell	$8\frac{3}{8}$	1	4-str.	1.07	1.00	32	$14\frac{1}{2}$	1	1	$3\frac{1}{4}$	$4\frac{1}{2}$	1.8	2	46.06
			Class "A"—Steam												
Ifit 7 ..	A. W. Cockman	$15\frac{7}{8}$	2	s.a.	0.750	0.875	40	16	1	1	$3\frac{15}{16}$	8	2.9	2	52.45
			Class "B" (i.c.)												
Sparky II ..	G. A. Lines	7	1	2-str.	$1\frac{1}{8}$	$\frac{7}{8}$	38	13	1	1	$3\frac{3}{8}$	7	2	2	61.0
Gamma ..	R. A. Mitchell	$5\frac{3}{16}$	s.s.	2-str.	0.74	0.70	28	12	1	2	$2\frac{3}{4}$	5	1.0	2	48.7
Sparta ..	N. F. Hodges	$5\frac{3}{16}$	1	2-str.	$1\frac{1}{8}$	$\frac{7}{8}$	29	10	1	1	3	6	1.7	2	41.0
			Class "B"—Steam												
Vesta II ..	F. Jutton	$7\frac{11}{16}$	1	s.a.	$\frac{7}{8}$	$\frac{7}{8}$	$28\frac{1}{2}$	$12\frac{1}{2}$	1	1	3	$7\frac{1}{2}$	1.75	2	51.5
			Class "C" (i.c.)												
Jo-Mac ..	D. Innes	$4\frac{1}{4}$	1	2-str.	$\frac{15}{16}$	$\frac{7}{8}$	30	9	1	1	$2\frac{3}{4}$	$4\frac{1}{2}$	1.25	2	55.3
Don II ..	P. Ribbeck	$1\frac{7}{8}$	1	2-str.	21/32	$\frac{7}{8}$	24	$6\frac{3}{4}$	1	1	$3\frac{1}{8}$	$6\frac{1}{2}$	2.75	2	52.5
Foz ..	R. A. Phillips	5	1	2-str.	0.939	0.875	$25\frac{9}{16}$	$11\frac{7}{16}$	1	1	$2\frac{1}{4}$	6	0.385	2	52.4
Bullrush Jr. II	G. D. Noble	$4\frac{1}{8}$	1	2-str.	1	$\frac{3}{4}$	24	$11\frac{1}{2}$	1	1	$2\frac{3}{4}$	6	1.1	2	51.14
Moth ..	J. H. Benson	$3\frac{3}{8}$	1	2-str.	29/32	$\frac{7}{8}$	24	10	1	1	$2\frac{5}{8}$	6	1.125	2	40.75

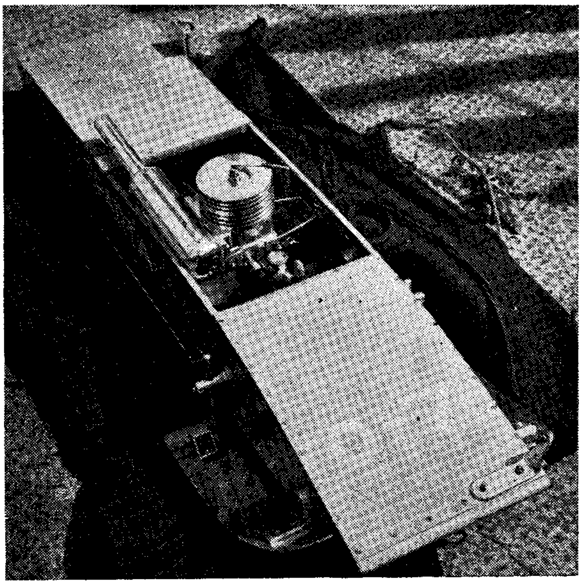


Mr. A. W. Cockman starting " Ifit VII " at a recent regatta

There is, however, still much to be said in favour of the larger boats ; assuming them to be equally well designed as the smaller classes, they should be capable of maintaining better stability than the latter, under the weather conditions which unfortunately prevail in this country. The larger engines, too, are somewhat easier to construct than very small ones, and less liable to be put completely off form by climatic conditions or slight misadjustment. Against this, however, is the fact that a 30-c.c. engine which attains a performance in keeping with modern standards is liable to be too much for a single man to handle, unless means are provided for getting



" Vesta II " bears many scars, but is still capable of maintaining its reputation for speed and thrills



Mr. N. Hodges's "Sparta"

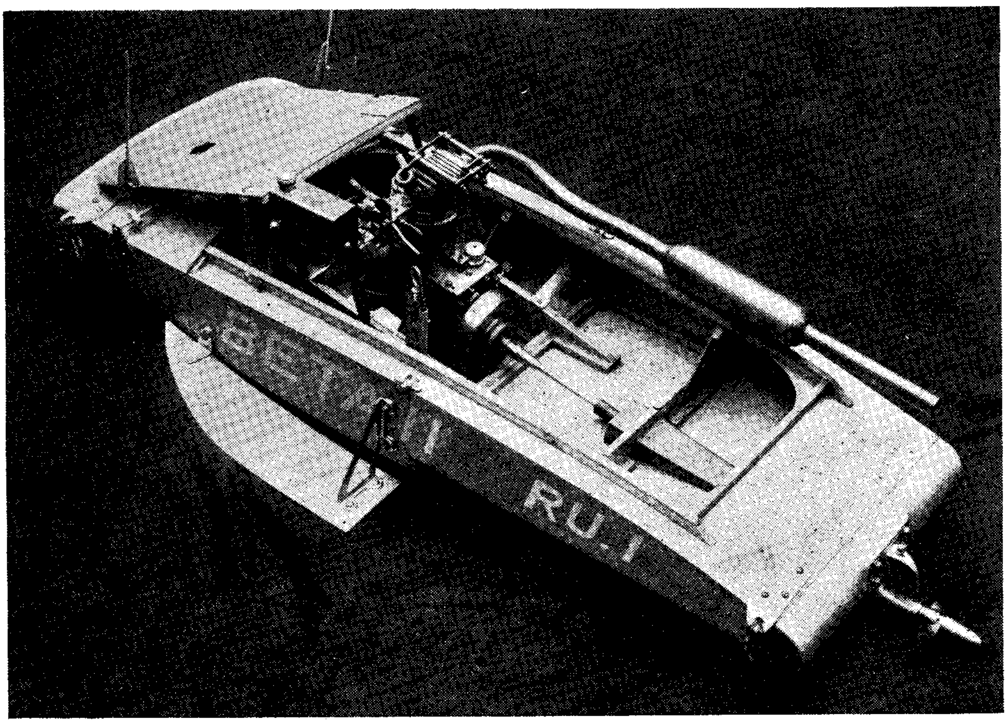
the boat away under reduced power and opening up by means of a delayed action control device.

Most of the hulls have the front planes built separately and attached either to the floor or sides of an otherwise stepless hull. Metal is strongly favoured for these planes, though exceptions are seen in such cases as the hollow "pontoon" type planes of *Ifit VII*. There are still problems in the secure fixing of planes to a very light hull structure, and metal planes, even of stout and rigid construction are not infrequently loosened or bent. A good example of built-in "sponson" type planes is seen in *Foz*.

The methods and materials used in main hull construction remain much the same, and it is difficult to improve on the framed wooden hull with three-ply covering for structural strength in relation to weight, and durability under arduous conditions.

Engine Design

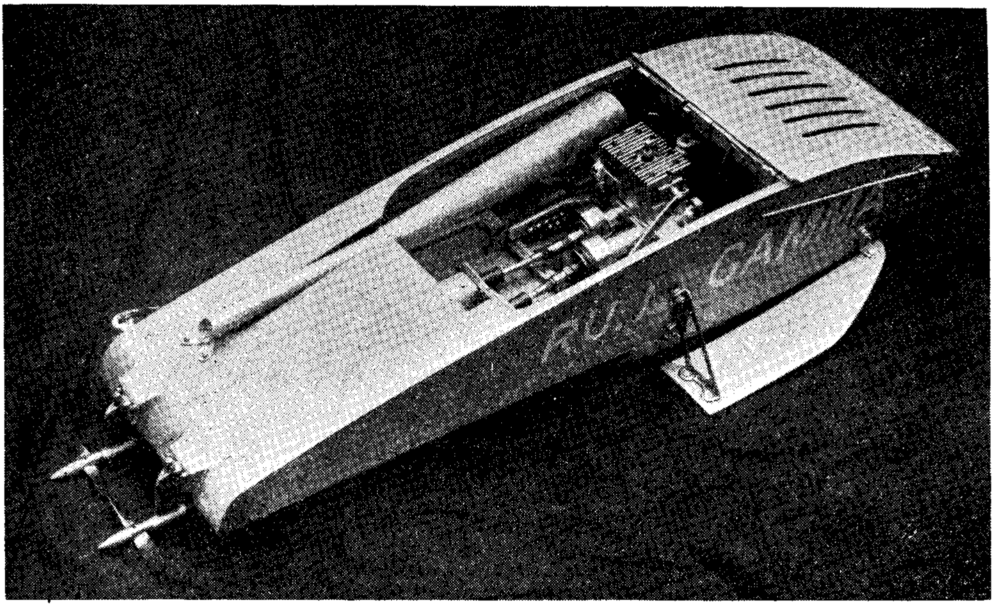
The two-stroke engine seems to have completely swept the board in the smaller classes; few modern con-



Mr. R. A. Mitchell's "Beta II," one of the most consistent and clean-running 15 c.c. boats

structors are apparently willing to tackle the problems in four-stroke engine design. No doubt the mechanical simplicity of the two-stroke is an attractive feature, and it is also possible to make it much lighter in construction for a given capacity. Simplified forms of ignition are also more readily applicable to the two-stroke, and this also applies, to some extent, to the use of special fuels.

Perhaps the most daring, and certainly the most interesting, departure in engine design is the split-single engine of *Gamma*. Many model engineers have discussed the possibilities of this form of two-stroke, and several experimental engines have been built, but this is the first time such an engine has produced signal success in a model speed boat. The particular form of design adopted involves the use of two crankshafts turning in opposite directions, and this feature has been utilised to furnish a direct drive to two propellers—again the first instance of the successful application of the latter principle.



The twin propellers and split-single engine of Mr. R. A. Mitchell's "Gamma" are entirely new innovations in model speed-boat design

There is, however, some danger of over-simplification of power plant, and some modern boats are tending to become rather stark and uninteresting as a result. This is not to imply that mere elaboration, for its own sake, is a virtue; the contrary is more truly the case. But the attraction of model boats of all kinds lies largely in their mechanical details, and interest is liable to decline, except among those who consider nothing but sheer speed and spectacular effect, if they become too severe or stereotyped in design.

The four-stroke engine should not be allowed to die of neglect; even in the smaller sizes it has definite possibilities, and the extra work involved in its construction should be but an added incentive to the lover of mechanical craftsmanship. Evidence is provided by the attainments of *Faro* and *Beta II* that this type of engine is quite capable of holding its own.

These remarks apply very much to flash steam plants too; it would seem that the only thing keeping this form of power alive at present is the sheer enthusiasm and perseverance of its protagonists. Its two representatives, *Ifit VII* and *Vesta II*, show clearly that flash steam is far from being outclassed; but the practical activity in this field is woefully small.

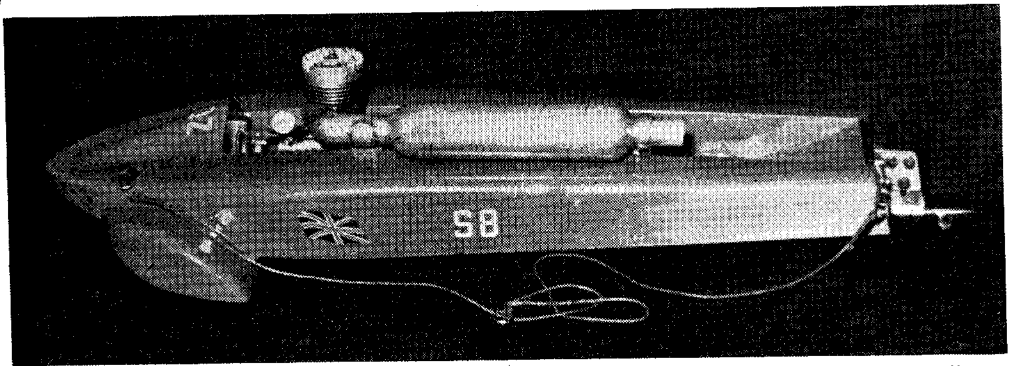
In the case of Mr. Mitchell's boat, *Gamma*, the run recorded in the competition entry was made with the silencer removed, enabling the performance to be improved upon by some 5 m.p.h. As the rules for the "M.E." Speed-Boat Competition do not mention silencers, this entry has been admitted; but in view of the increasing importance of reducing noise in competition models, this question will have to be given serious consideration when the rules are revised in the near future. All the other boats are fitted with silencers in accordance with M.P.B.A. rules.

Both Mr. Mitchell's boats, *Beta II* and *Gamma*, have unfortunately exceeded the weight limits for the classes to which they should belong on the basis of engine capacity, and have thus had to be placed in higher classes. They have, however, put up a performance which qualifies them to rank with honour among boats with larger engines.

Some competitors have in the past been inclined to criticise the rather rigid class restrictions in the "M.E." Speed-Boat Competition, but they have all been very carefully considered,

with a view to giving the fairest possible comparisons between boats of widely varying design, and to encourage real progress in this respect, rather than to favour the attainment of sheer speed at all costs, with no holds barred. It has been proved in many forms of competitive sport that the wholesale scrapping or loosening of restrictions, so far from promoting progress, more often leads to stagnation or even degeneration; but obviously the restrictions must be very wisely framed to avoid cramping the style of the designer with new ideas. We are always open to suggestions from readers regarding the improvement of this, or any other, competition organised by the "M.E."

It is often remarked that the speeds attained by the use of small engines are increasing by leaps and bounds, while the larger engines seem to make very slow progress in performance. This is often taken to imply that the latter are relatively much less efficient, or are actually on the decline; but it would be more correct to say that the smaller engines are now, as a result of long and patient investigation, beginning to come into line with the larger engines in proportionate power output. As we have pointed out on more than one previous occasions, speed is largely a matter of power-weight ratio, other things being equal, and a small engine in a light hull should theoretically be capable of exactly the same speed as a larger engine in a proportionately heavier hull. This, of course, is an over-simplification of the practical problems involved, and all model engineers know that theory does not always work out as it should do in practice. The statement is basically true, nevertheless, and one should never be surprised to hear that a boat with a very tiny engine has proved capable of emulating the feats of much larger and more powerful boats.



An outstanding example of clean design and good workmanship: Mr. R. A. Phillips's "Foz"

Propellers

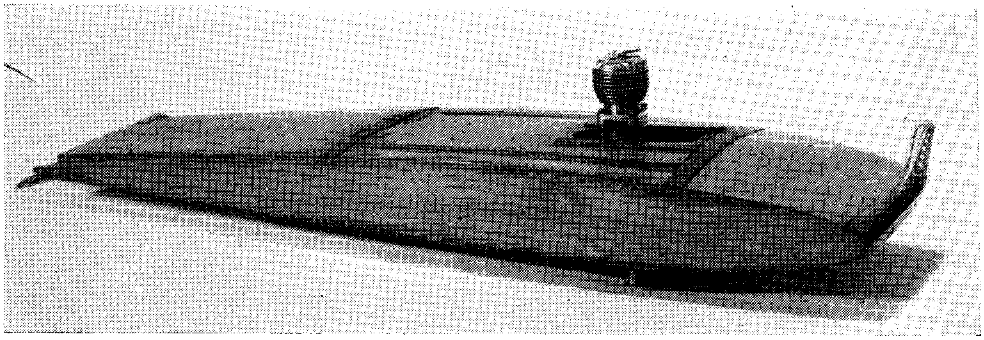
There have been no sweeping changes or developments in propeller design or methods of application. The surface propeller is now practically universal, though as we have observed in the past, it is difficult to draw a definite line between surface and submerged propellers, and one may become the other by relatively minor changes in hull design or planing attitude. Blade area, and other salient features and dimensions of propellers, vary widely, indicating that nothing approaching finality in design has been reached. The two-bladed propeller is without a rival, probably because it is the easiest form to construct and adjust.

It will be noted that the use of twin propellers, rotating in opposite directions, on *Gamma*, not only enables torque reaction to be entirely cancelled out, but it eliminates the side thrust produced by a single surface propeller also to be balanced, so that the yawing tendency of the boat is eliminated. This should definitely make for higher propulsive efficiency, apart from the improvement in hull stability which it confers. It is, however, necessary to match the two propellers carefully so that one does not become a mere "passenger" while the other does all the work; but possibly this point is not so important as it sounds because of the high percentage of slip usually encountered in high-speed surface propellers.

Personal Notes

Most of the competitors are well known to readers of the "M.E.", having featured in regatta reports, or in some cases, as contributors of articles on model speed boat subjects; to omit further mention of their names, so far from implying lack of appreciation, will, we hope, be regarded as the silent homage due to old and valued friends. Among the veterans, none is more worthy of mention than Mr. G. D. Noble, who was one of the very early pioneers of the flash steam hydroplane, and now, at an age which has more than qualified him for honourable retirement, has produced a performance which puts many of the younger exponents to shame. It is interesting to note, also, that he has produced a new boat, in a different class, with a different type of engine to that with which he has previously been associated. Little is known of this boat so far, and we await further information with interest—but who says that you can't teach old dogs new tricks?

Among the competitors whose names may not be very familiar, Mr. Norman Hodges is a very energetic member of the Orpington club, which has already won its spurs through the achieve-



A newcomer to the " M.E." Speed-Boat Competition, Mr. P. Ribbeck's "Don II" is this year's " dark horse "

ments of another member, Mr. G. Lines, whose influence is to be seen in Mr. Hodges's boat. *Sparta* is very similar to the original *Sparky,* including the design of the engine, and seems in a fair way towards emulating the latter's performance.

The really "dark horse" of the competition is Mr. Peter Ribbeck, who has not previously featured in a " M.E." Speed-Boat Competition, and as a member of the Glasgow S.M.E., is probably unknown personally to most of the enthusiasts who have the misfortune to be born south o' the Tweed. But his more than creditable performance with *Don II* is not to be lightly regarded as mere beginner's luck, as he has been a tireless but unostentatious worker on i.c. engines and other types of models for many years. Like most of his countrymen, he is sparing of words ; but it is to be hoped that he will be persuaded to tell us the story of this boat's evolution in due course.

All the competitors, whether their names feature at the top of their class list or otherwise, are to be highly congratulated on their efforts. This review of the competition will, it is hoped, not only encourage prospective entrants in the future, but also give them some useful information on the technical details of the boats which have been entered ; from past experience, however, there will probably be the usual clamour for further details. We therefore take this opportunity of reminding competitors, or any other readers who have information to offer on this subject, that practical articles are greatly in demand. Readers, quite rightly, value very highly the accounts of problems and difficulties, even the mistakes, encountered by those who have tackled the job before them. Such articles are always much more convincing than attempts to reduce such an inexact science to stereotyped rules and set designs.

Tips on Machining Cast-Iron

WHEN shaping, boring, or turning a cast-iron job, trouble can often arise if due care is not taken regarding one or two important points. For instance, what is more annoying to find a blow-hole appear in a casting at the last moment when most of the work is machine-finished. As far as is possible, it is always a good plan to rough-machine all the work at each setting before taking any finish cuts. By this means, if a blow-hole is found and can be sealed up in some way, the work is much more easy to reset for further machining.

Some castings contain a very hard skin and difficulty is often experienced in taking the first cut. The tool should be allowed to get well under the surface of the scale, which tends to break it up as the cut advances. Often, where possible, it is a good plan to chip and file the edge of the work before the first tool cut is applied.

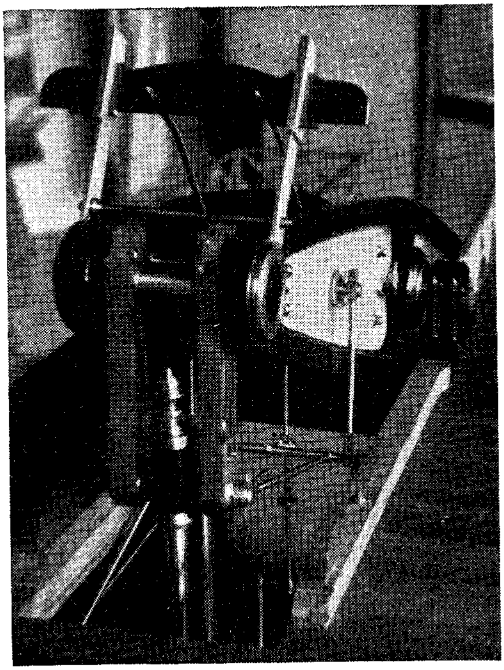
It is very important to remember when machining cast-iron not to allow oil or any kind of grease to get on the surface when machining. Take, for instance, the bore of a cylinder where many turners are apt to rub the fingers up and down in order to test for smooth surface. The fingers tend to produce a fine greasy patch on the iron, and the flat edge of the finishing tool will ride over the grease, and much difficulty will be experienced in obtaining a true bore with a good surface. If you are tempted to feel the surface when taking a finish cut, make quite sure the fingers are clean and quite dry.

Due attention should, at all times, be given to the method of holding cast-iron work in a chuck or faceplate, also on the drill table or shaping machine. It must be remembered that cast-iron will readily break if an undue bending force is applied to any narrow parts and projections on the work. When chucking a casting, it is wise to make sure the jaws grip the work at points where there is plenty of metal, and only tighten up the chuck enough to hold the work secure. Likewise, care must be taken when bolting the job to a faceplate or drill table. Where the job is bolted down on projections or flanges, make quite sure the space between the faceplate and work is well packed with solid metal strips.

—W. J. SAUNDERS.

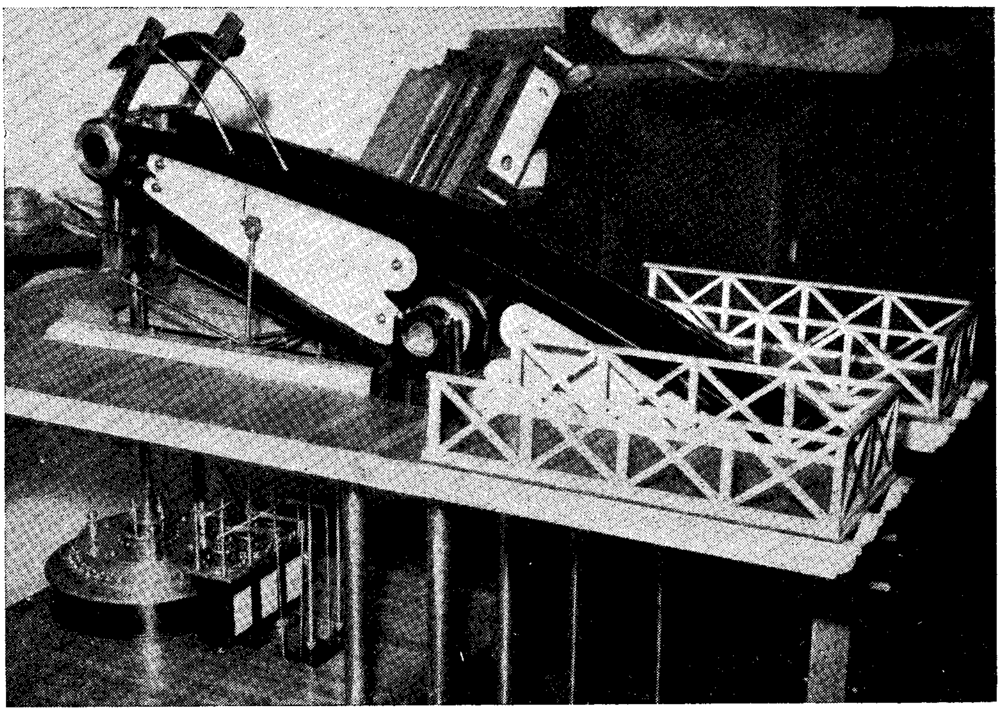
A Cornish Pumping Engine

An Outstanding 1-in. scale model built by Mr. R. Jarvis of High Wycombe

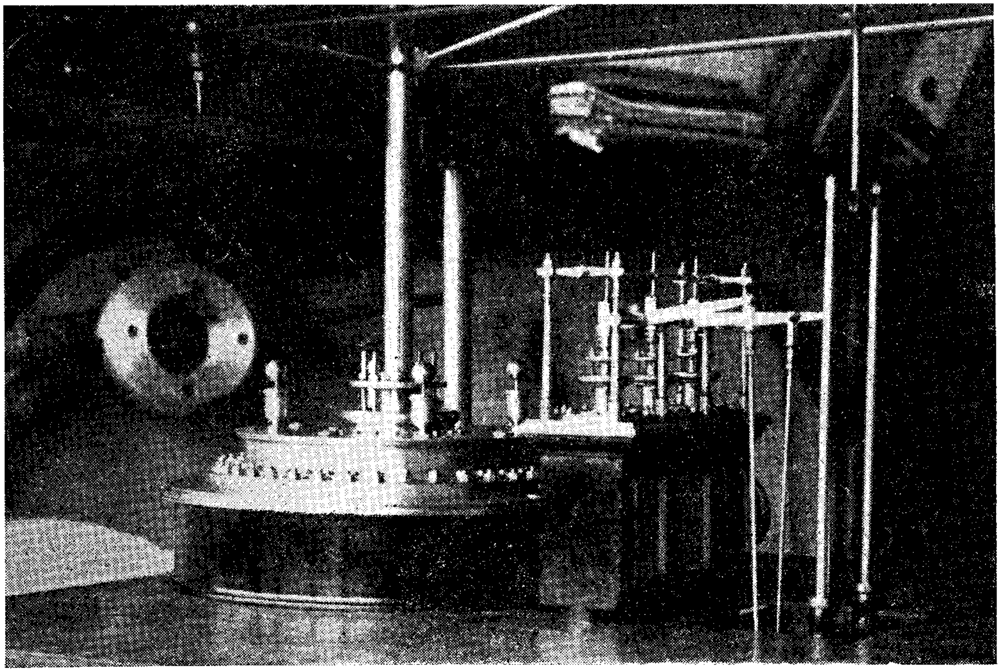


Rear end of beam, with pump shaft in "down" position

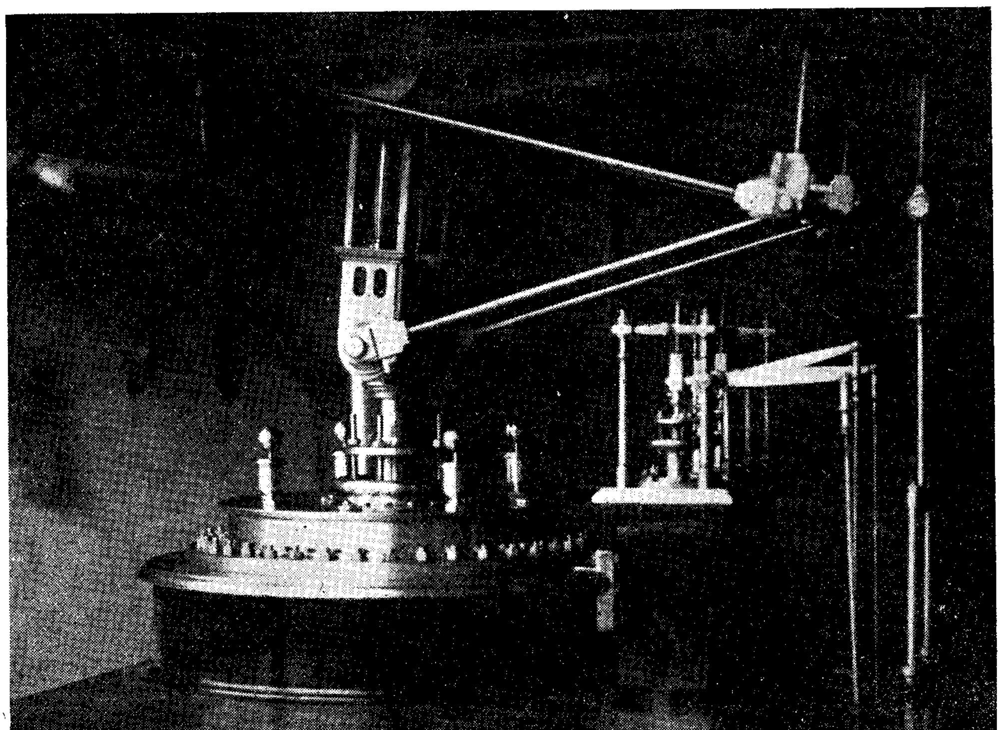
THERE are few subjects more neglected today than that stalwart masterpiece of steam engineering, the Cornish pumping engine. True, there is a Society whose members have long appreciated the importance of such engines as historical relics of a once flourishing industry, in addition to their right to recognition as the forerunners of modern steam practice; but unfortunately, very little information is available to the layman, and, in consequence, few genuine models exist.



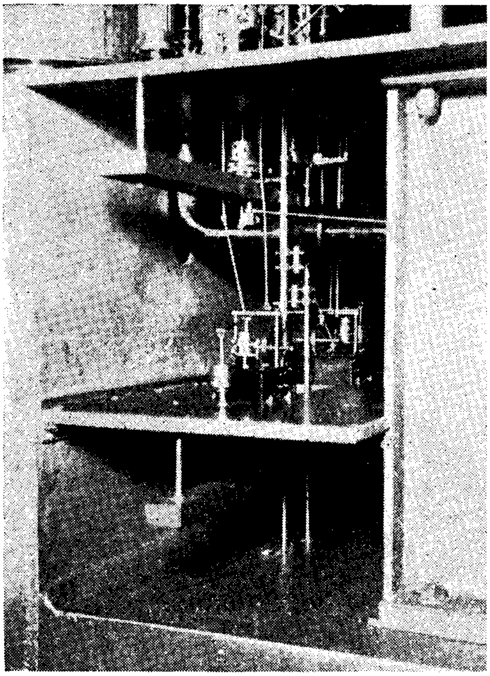
The top floor, showing the beam and part of the parallel motion, with the pump shaft in "down" position



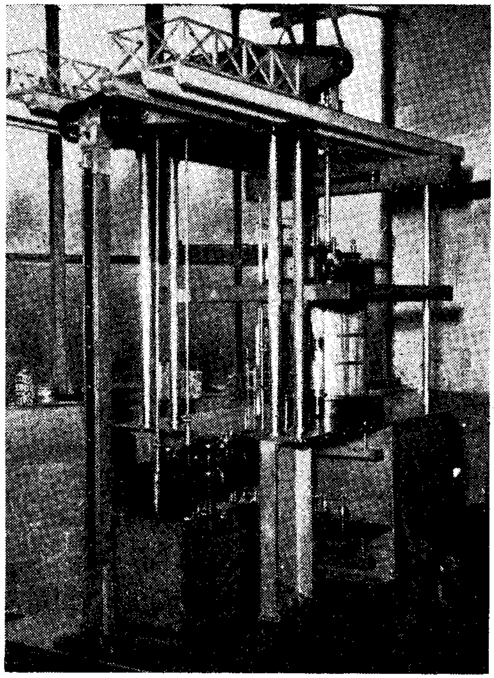
The cylinder-head and valve chest in the middle chamber, with the pump shaft in "down" position



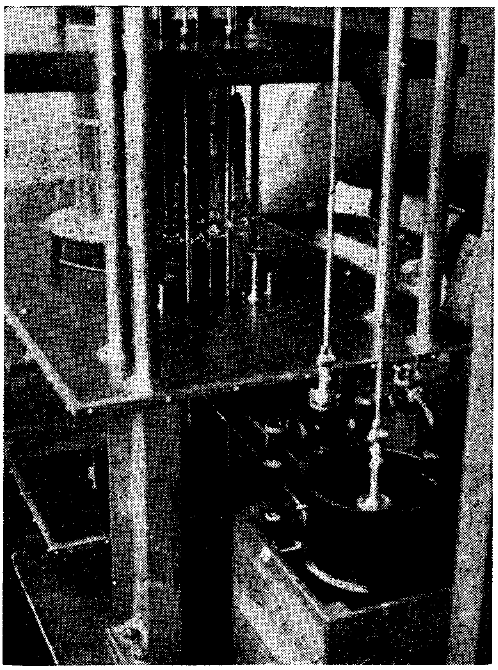
View of cylinder-head with the pump shaft in the " up " position. Note the James Watt parallel motion and cylinder oil feeders



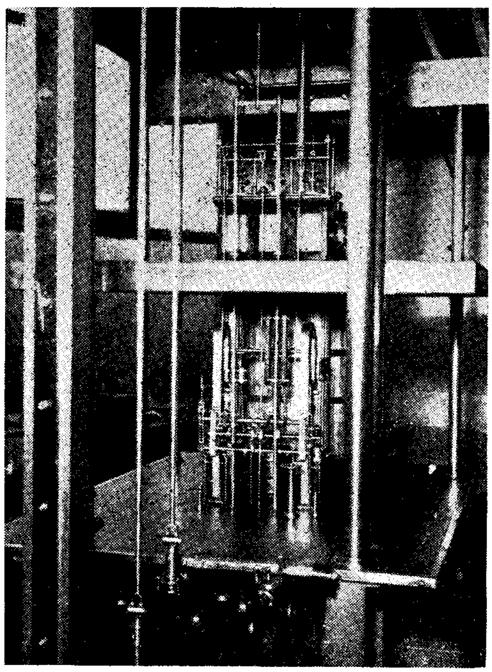
The cockpit, right-hand side, and governing mechanism



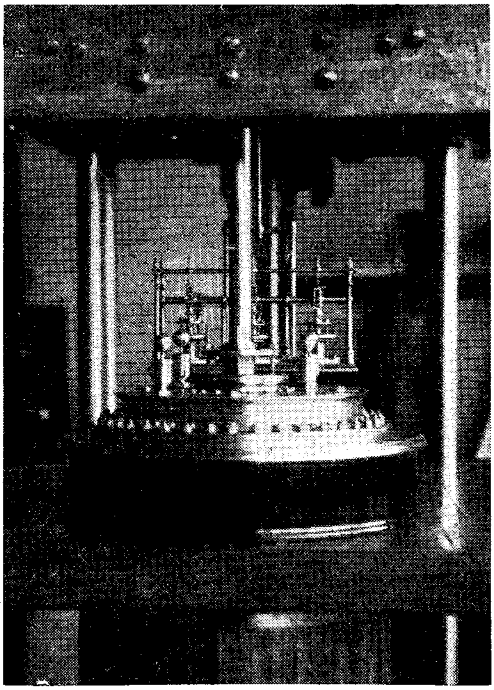
General view of Mr. Jarvis's model of a Cornish pumping engine



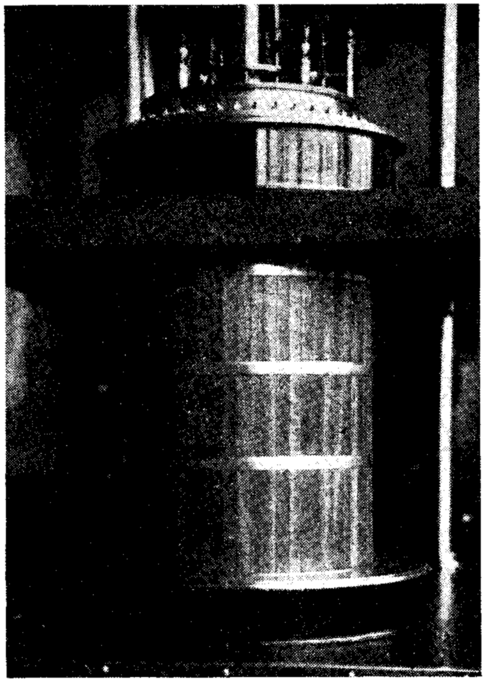
Showing, nearest the camera, condenser, with cockpit, ground and middle chamber floors



Showing the intricate valve gear on the ground floor



Rear view of cylinder. Note realistic appearance of upper beam



The nicely lagged cylinder, with its base on the ground floor

In view of these facts, it will not be difficult to imagine our surprise when, a few months ago, we were handed a letter from a lady who claimed that her husband had constructed a working scale model. Our reply was in the nature of an immediate request to view, and the photographs published herewith will show how very worthwhile our visit turned out to be.

Mr. Jarvis, the owner-builder, is an engineer by profession, and the workmanship displayed on this model, which is of an 80-in. prototype, is a legacy of his patience and aptitude. Before taking us to see the model, he spent a considerable amount of time unfolding for us the historical facts apertaining to the development of the Cornish engine, so that when eventually we arrived at the site of the model, we were able to appreciate to the full the magnitude of his success.

First Patterns

First of all, the drawings had to be scaled 1 in. : 1 ft., then a start was made on the bob (beam) and cylinder patterns. Mr. Jarvis told us that he had not previously done any pattern making and very unassumingly pointed out where he thought he had faltered. In our opinion, both patterns and castings were first class and left little to be desired. As we went through the patterns, however, discussing the methods of construction and finish, it was interesting to note how they *had*, in fact, improved as time went on until, with the last patterns to be made, a distinct elevation in quality over the first batch was noticeable.

Perhaps one of the most interesting processes involved and one which should be an object lesson to other readers who may be similarly placed, was the machining of the various components and the conditions under which this work was destined to be completed.

The Work Must Go On

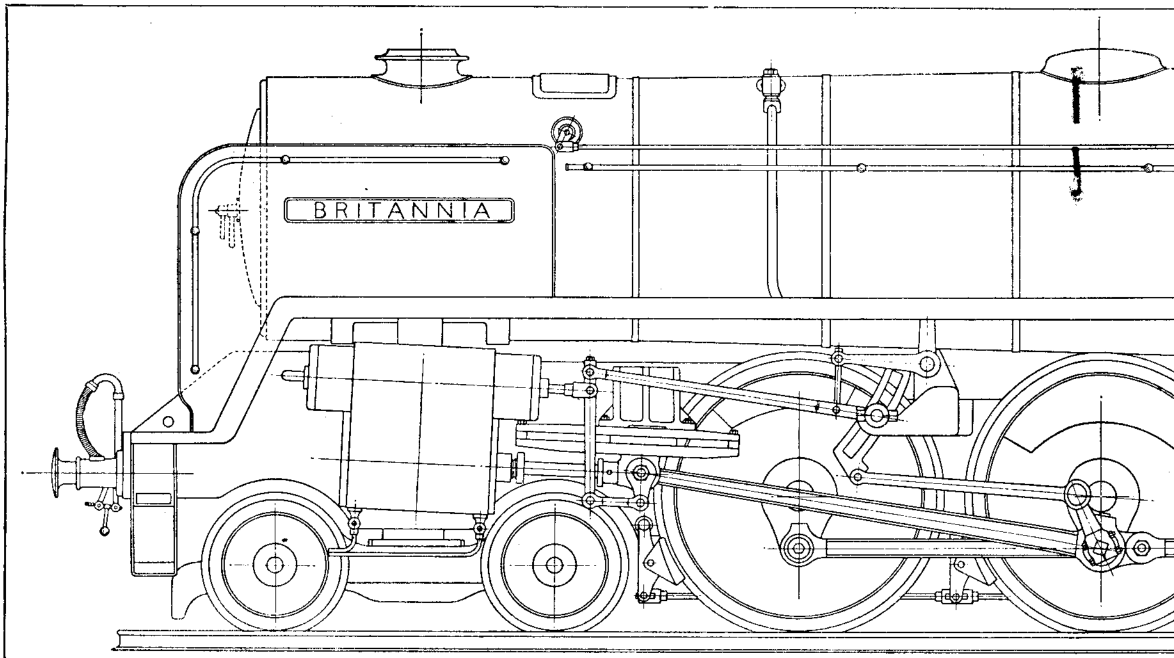
Owing to circumstances over which he had no control, Mr. Jarvis found himself without a home workshop. Nothing daunted, he decided that work must proceed ; so, while others might have spent months protesting against their unfortunate shortcomings, this enthusiast cheerfully returned to his place of work in the evenings and proceeded to remove whatever job had been left by the turner in whichever lathe he decided to use on that particular occasion. He would then set up his own job and proceed with his turning, screw-cutting, milling, etc., and before going home, would re-set the turner's work exactly as he had left it so that he in turn could proceed without loss of time on the following morning. This in itself, repeated night after night for over two years, might seem prodigious ; but when we tell you that the lathes in question were of a size undreamt of by most model makers, and of an age nearer the century than that of the operator, you will, we hope, fully realise the enormity of the task.

"Britannia" in $3\frac{1}{2}$-in. Ga

WELL, I told you some time ago, that when the first of the new standard British Railways locomotives took the road, certain good folk would be in for a bit of a surprise ; a glance at the reproduced drawing, will explain why. The conjectures of the various protagonists of the different regions, and the alleged " inside information " of a few " would-be-wise " mer-

There is one thing which I expect everybody will at once notice ; the " family likeness " between *Britannia* and *Tugboat Annie* and *Pamela*. When I designed and built *Tugboat Annie*, my objects were to produce a locomotive that would not only be the " answer to the driver's prayer," inasmuch as it would be able to deal with any load ever likely to be put behind

mod
emp
welc
utili
I
that
diffe
scri



The genuine " Lion-and-Whee

chants, have amused your humble servant quite a lot ! How I came to be building a $3\frac{1}{2}$-in. gauge genuine " lion-and-wheel brand " engine in my own workshop, is a matter that doesn't concern followers of these notes ; what *does* concern them, is that two days after the appearance of big sister at Marylebone, the little one is able to make her debut in these pages, so nobody can say with truth, that this journal isn't right up to date ! Probably some of the good folk who are reading these lines, saw the engine at Marylebone, at the naming ceremony, and took note of her various characteristics ; if so, they will find them reproduced in her small sister (or should we say daughter ?), but I would hereby remind all and sundry, that she is in no sense a " model." She is intended to do an equivalent job on $3\frac{1}{2}$-in. gauge, to that which the big one does on 4 ft. $8\frac{1}{2}$-in. gauge ; and as Nature won't be " scaled," the little engine differs from the big one in certain ways which are necessitated by the difference in size, and to obtain the maximum of efficiency.

it, run at a high speed with same, and never be short of steam ; but would be easy to service and generally maintain. To that end, I made everything as accessible as possible, adopted unit-construction for valve-gears and other components, and gave the engine plenty of cylinder power, plus a boiler that would supply the cylinders with all the steam they needed, under any conditions of service. The designers of *Britannia* had exactly the same objects in mind, so there is nothing strange in the results of our efforts bearing some resemblance ; we both knew exactly what we wanted, and got it. When the spam cans go in for rebuilding, the same thing will probably happen ; in fact, I shouldn't be at all surprised to find that they are being converted to " lion-and-wheel-type-sevens," so that my own ideas about rebuilding them, will not be far out. So much for generalities ; now let us take a look at the little engine.

She is Different

It is hardly necessary to state that the most

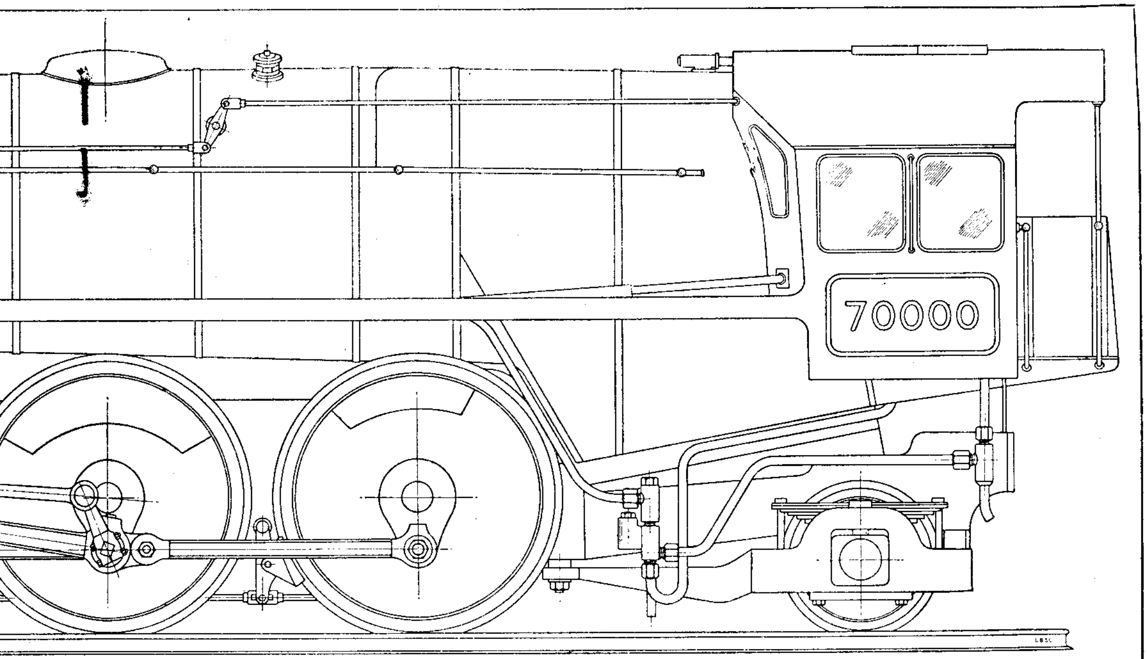
hav
owi
bur
con
ing
and
will
not
be
cyli
opt
sup
cast
T
this
my
cros
stee
Dia
this
I'll
stay
a fe

. Gauge—by "L.B.S.C."

modern methods of construction have been employed in building the full-sized *Britannia*; welding, fabrication and so on, have all been utilised.

I have done the same in the little one, so that the actual construction will be a little different from that of the engines hitherto described in these notes. No castings whatever

to right-angles to a close measurement limit. They were lying on my bench when one of my few personal friends called one evening. He saw them, and asked what they were. I said I had been trying to see if the bending brake would tackle $\frac{1}{8}$-in. steel without a break of another sort. He said, wouldn't the pieces come in fine for frame stays!!



"*Lion-and-Wheel*" *brand*

have been used in the frame assembly of my own engine; and if castings are what the bureaucrats call "in short supply," the same construction may be used by all builders. Castings for bogie bolster, frame stays, bogie centre and pony frames may be used if available, and will save a certain amount of time, but they are not absolutely essential. The axle-boxes may be castings, or cut from bar; the wheels and cylinders are, of course, cast. Castings are optional for the guide-bar bracket, and link support, but it isn't difficult to build up, where castings are *non est.*

The main frames are of $\frac{1}{8}$-in. steel, as usual in this size, but they are set closer together; on my own engine, the bolster is fabricated, and the cross stays and trailing stay bent up from $\frac{1}{8}$-in. steel plate, which was a nice little test for my Diacro bending brake. The makers guarantee this machine to bend to precision accuracy, and I'll say it certainly does. Before making the stays for the engine frames, I had a trial run on a few bits of $\frac{1}{8}$-in. strip $1\frac{1}{2}$ in. wide, bending them

Hornblocks Like Big Sister

The hornblocks on this engine aren't hornblocks at all (says Pat), but arch-shaped pieces of strip steel, bronze-welded into the openings in the frame, in such a way that the frames come in the middle of the strip; this is why the frames are narrower than usual. The hornstays (or pedestal ties, or frame keeps—they are known by other names nowadays!) naturally cannot be bolted or screwed end-on to either the strips or the frame plates, so little blocks of steel are bronze-welded on to the frame, at the side of each axlebox opening. Each piece that takes the place of the ordinary cast hornblock, was bent around a piece of 1 in. square bar, to the length of the axlebox opening, so there was no question about them not fitting correctly. I had no trouble in bronze-welding the strips and blocks, as I used an acetylene blowpipe; but they can be brazed, if set up properly, and all being well, I shall describe how to do the job thus.

The cradle, or trailing frame members, are also of $\frac{1}{8}$-in. steel, and are somewhat similar to

those described for *Pamela*; but instead of separate distance-pieces between main and cradle frames (the latter are narrow, as the full-sized engine is intended for use on any principal B.R. line, and there are some mighty sharp curves on the old Great Eastern) I have bent up a special stay which also forms the support for the pony-truck king-pin. The sides of this take the place of the distance-pieces; and as there is another stay between the sides of the cradle, there are four thicknesses of $\frac{1}{8}$-in. steel at this point. As the whole bag of tricks is bronze-welded up solid, it is a million dollars to a pinch of snuff, that the firebox has a safer seat than any M.P. with a five-figure majority. The ends of the main and cradle frames are furnished with buffer-and drag-beams of angle steel, slotted to receive them. As the running-boards are set high, on the American style, and clear of the frames, the beams are narrow, the front one being only wide enough to take the buffers, and the rear one extending little beyond frame width. The top members are cut off slantwise, like the gussets on the big engine, and the whole lot bronze-welded. When assembling, I set up the whole complete conglomeration on a surface plate, adjusted it until there wasn't a ghost of a rock or twist, and clamped it in four places before getting busy with the blowpipe; and I'll say that with the bogie bolster and the two stays bolted in position, nothing short of a bomb explosion or an earthquake shock, could knock it out of plumb. I believe in a good solid foundation!

Roller-skate

The big engine has roller-bearings throughout; but as it is difficult to get proper roller-bearings of correct size for the $3\frac{1}{2}$-in. job, I have substituted ball-bearings for the driving axles, and either ball-bearings or large needle-bearings for the carrying axles. I have some of the latter, which I am using on my own engine. It is, of course, possible to make roller-bearings—of a sort!—in your own workshop; but I have yet to see the home-made article that gives as easy running as a good plain bearing, and neither Swindon nor Crewe would try to compete with Hoffman, Skefko, Timken or any other specialist firm! My own engine has two double-row ball-bearings, side by side, in each coupled axlebox—four rows of balls per journal—and I guess I'll be driving the *Astral Belle* before any slack develops in those boxes. The wheels are fitted in a special way which I will tell you all about in the instructions. Only one ball-bearing will be needed in each of the bogie, pony, and tender axleboxes. The boxes themselves are of the ordinary kind, with double spiral springs to each coupled axlebox. These boxes can be used as plain-bearing boxes by anybody who doesn't want to take the trouble to fit ball-bearings. The carrying axles may have either working leaf springs, including the bogie, which is equalised; or spiral springs in dummy cast leaf-springs may be used.

Wheels

The wheels are L.M.S. type with triangular rims and oval spokes; and castings will be available, with the correct balance-weights in the coupled wheels. Contrary to usual practice, the huge weight in the drivers, is opposite to the crankpin, and the smaller weights in the leading and trailing wheels are slightly offset, as can be seen from the illustration. I must confess to being too lazy—or maybe too tired!—to draw in all the spokes; there are twenty in each wheel. In the full size engine, the joint between wheel centre and tyre, is at the edge of the spokes as usual; so don't go and spoil the appearance by turning grooves in the face of the tyre. The only grooves I've ever seen there, are turning-tool scratches.

Cylinders and Motion

You don't have to look twice at the illustration, to see that I am following my usual practice in adopting either "scale" or bigger-than-scale cylinders. In the present case, the bore and stroke are "scale," viz $1\frac{1}{4}$ in. bore and $1\frac{3}{4}$ in. stroke, with Bill Massive piston-valves to match; but as we have to use comparatively thicker cylinder walls, and a much wider pistion, the cylinders are larger outside, than is proportionate to the full-sized engine. However, this doesn't make a half-penny-worth of difference to the rest of the engine, as the cylinder castings are still clear of the bogie wheels, and are not high enough to affect the running boards. The guide bars are entirely separate from the cylinders, as on the Southern "Lord Nelsons" and "Schools" classes, and are of the same type, with a single slipper above the crosshead. The assembly is supported by a substantial bracket. It is possible to take off the cylinders, in an emergency, without disturbing the motion; and this particular type of guide-bar and bracket, is quite clear of the radius-rod and combination lever of the valve-gear. In the big engine, a guide is provided for the valve-spindle, but in the little one, it isn't needed, the parts being so light as to need no support; so I have left it out.

The valve-gear is a particularly neat arrangement of Walschaerts; and in the big engine, the unit-construction idea has been followed by hanging the link in a simple bracket with plummer-block bearings. This makes it an easy matter to change the link, or any of the rods attached to it. The Southern type of lifting and lowering gear is used, with double lifting arms, the expansion-link working between the arms. The reverse-shaft is carried in a bearing at each side, which forms part of the expansion-link bracket. A good long expansion-link is used, with plenty of offset at the bottom. The valve-gear on our little girl is a pretty faithful copy of the big one, and will give a very good steam distribution, ensuring economical working. I have shown the return-crank mounted on a square, as in full size; but this necessitates exact cutting of the square, to ensure the return crank being at the exact angle, and an ordinary round spigot, with the return crank set truly and pinned to it, may be substituted if desired. Both connecting- and coupling-rods are fluted, the latter being contrary to the usual practice on the G.W. and L.M.S. engines.

Boiler

The boiler shell is the same shape and size as on a spam can, but the inside is different on the big engine. Also it has a respectable smokebox and a single L.M.S.-type chimney. The boiler of the little one is pretty much the same as I specified for *Pamela*, but it differs in details. The safety-valves are behind the dome, and set one each side of the centre line, like those on the *Austere Ada* type, but they are L.M.S. pattern. The top feeds are not combined in one fitting, but there are two separate clackboxes as shown. We can make these dummy for sake of neatness, and fit two auxiliary clacks, same as I specified for *Pamela* and *Doris* ; or they may be working clacks made a little larger than shown. Boiler feeds may be just to your liking ; I shall describe a pump, for those who prefer it, or two injectors may be fitted, as in full size. It will be noticed that I have shown a vertical injector, nothing like Davies and Metcalfe ever turned out, but it works all right and it suits the engine, which also has vertical injectors in the same place, in the full-sized job. I thought it would be a change !

Another innovation in small size, is the front-end throttle, worked by a long lever hanging down where the driver can get hold of it nicely, without bothering to get up out of his comfortable seat. The rod goes along outside the boiler, and is in two sections, with a rocking lever in between. When I was drawing out this detail, I couldn't help grinning at the thought of our departed friend Bro. "Iron-Wire" Alexander, and his front-end throttle, which consisted of a plug cock in the smokebox, operated by a piece of iron wire running through a tube soldered into the boiler—but it *worked*, like everything else he described, and that is something which cannot be said for most of the old-time writers, *and* some more modern ones ! The throttle-valve in the present case is of the poppet type, and on the "hot" side of the superheater, so that the elements are always full of steam. There is a trapdoor arrangement on top of the smokebox, so that the valves are get-at-able. The big engine has a chime whistle on the side of the smokebox, connected to the hot header, so she ought to be able to sing in a loud, clear musical voice, and sound entirely free from colds or 'flu. We shall have to put ours underneath the ashpan, as on *Pamela*.

Details

The footplate fittings will be arranged as near as possible, in the small size, to those on the full sized engine ; as you will see, for example the injector water valve is on the engine, in the same place as it is on the big one. Incidentally, we shan't be able to keep to the "standard" arrangement of engine-and-tender pipe connections on this job, but will have to use a new arrangement, not that it matters a bean, because an ordinary tender couldn't be coupled to this engine, on account of the balcony at the back of the cab. I haven't had time to make a proper drawing of the tender yet, but it will appear, all being well, in a couple of week's time, or thereabouts. It is a simple six-wheeled affair, with a projecting frame which fits under the balcony, and couples up nicely to the engine, all pipe connections being readily accessible. The cab itself has the tumble-home sides and sloping front of the full-size engine, also a "sunshine" roof with sliding top, which gives easy access to the handles, and the firehole.

I nearly forgot to mention that the bogie will have a sliding block centre, as in full-size ; and the outside frame of the pony truck is double, the spring on each side being located between the two plates. The mechanical lubricator will be between the frames, ahead of the cylinders, as usual. Steam brake gear will be provided, the brake cylinder being just ahead of the firebox. I have shown the "blinkers" (smoke-lifting plates) as the big engine has them, but I shan't fit them to my own engine, as I reckon it spoils the appearance. Well, so much for the little *Britannia* ; now we will get on with the job of building one.

Tail Lamp

I hasten to assure those good folk who are waiting for details of the 2½-in. gauge North Eastern 0-8-0, that the above has NOT taken her place. I am getting out the details as promised ; and circumstances and the K.B.P. permitting, will commence the serial when *Pamela* is finished, which won't be long now.

For the Bookshelf

Locomotives of the Great North of Scotland Railway, by M. C. V. Allchin. (Southsea, Hants : Railway Hobbies Ltd., 86, Essex Road.) 24 pages. Illustrated. Price 2s. 6d. net.

The "Allchin" series of printed illustrated lists of the locomotives of the minor railways of Britain have established themselves as useful reference-handbooks for the locomotive enthusiasts library. This latest addition to the series is well up to the standard set by its predecessors ; it is divided into two parts to cover, respectively, the earlier and the later locomotives of the G.N.S.R., the period extending from the year 1854 to 1949.

Twenty-four illustrations record the designs of seven successive superintendents and form a fascinating pictorial presentation of steady, if not particularly spectacular progress, from the time of D. K. Clark. Also among the contents are lists of the locomotive superintendents and running sheds, notes on livery and engines acquired from other railways, and tables of classes, principal dimensions, L.N.E.R. classifications, and renumberings.

Novices' Corner

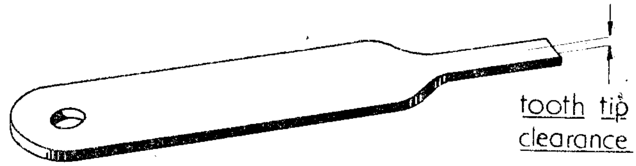


Fig. 1. *Gauge for meshing the change wheels*

Some Screwcutting Hints

THE change wheels forming the screwcutting train should always be correctly meshed so that they run together smoothly and with only a small amount of backlash. This setting will be made easier if a small, sheet-metal gauge is inserted in a tooth space at the point where the wheels meet ; the wheels are then closed on the gauge and secured in this position. A gauge of this kind is shown in Fig. 1, and, although it will be only a few thousandths of an inch in thickness, the actual thickness will depend on the pitch of the wheels in use. The proper thickness of sheet metal to use for making the gauge is, however, best found out by experimenting until the wheels, when set, run properly together.

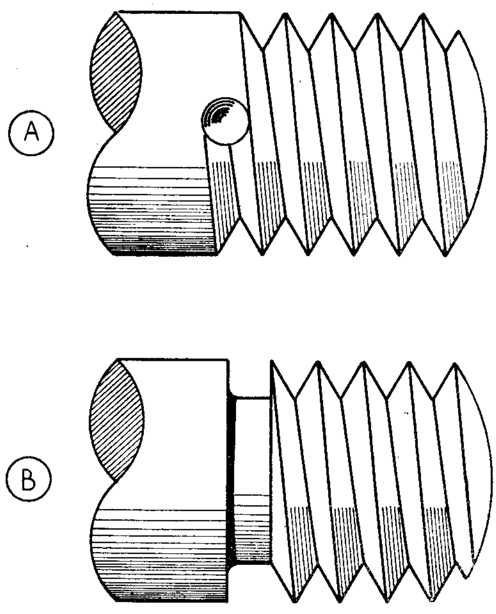


Fig. 2. *Forming a recess at the end of the thread*

If the gear train has been set up from a screwcutting chart, there should be no possibility of error, but if the wheel sizes have been calculated, it is advisable to prove the train, as it is called, before starting to machine. To prove the train : multiply together the number of teeth of all the driven wheels, and divide this product by the product of all the driving wheels ; finally, multiply the dividend, so obtained, by the number of threads per inch of the leadscrew. This last product gives the thread number that the lathe will cut. As an example, a 20-T. driving wheel on the mandrel meshes with a 40-T. wheel on the stud, and on the same stud is the second driving wheel of 30-T. which, in turn, meshes with the 60-T. driven wheel on the leadscrew.

The driven wheels are, therefore, 40 and 60, which when multiplied together equal 2,400 ; the product of the 20-T. and 30-T. driver wheels equals 600. The driven wheels divided by the drivers, therefore, equal 4, and this number multiplied by the leadscrew thread of 8, giving 32, indicates the thread cut.

To prepare the work for screwcutting, a recess should be formed in which the tool can finish at the end of the thread.

Formerly, it was a common practice to drill a shallow hole in the work to free the tip of the tool, as shown in Fig. 2A, but, here, if the feed is not stopped or the tool withdrawn at exactly the right moment, the point of the tool may be damaged. It is better, therefore, to turn a groove, as represented in Fig. 2B, in the work as deep as the thread and rather wider than a single thread ; this will enable the tool to be withdrawn or stopped before it reaches the shoulder formed on the work. To enable the thread to be cut to the correct angular form, it is essential to mount the tool at exactly lathe centre height. An easy way of checking the setting is to swing the tool turret and take a light cut across the end of the work ; the tool height is than adjusted until the tip of the tool cuts right to the centre of the work without leaving any unevenness. The tool must also be set squarely with the work ; that is to say, the centre-line of the V-point must stand at right-angles to the work surface. This setting is best made with the aid of a gauge of the pattern illustrated in Fig. 3. The gauge is held in contact with either the face of the chuck or with the work itself, and the tool is then adjusted to lie squarely in one of the V-notches.

Until experience has been gained, it will be found difficult to cut a thread up to a shoulder on the work even when the lathe is run slowly in back gear ; moreover, failure to withdraw the tool in time may result in damaging both the tool and the work.

If a long thread is being cut, the lathe can be stopped well before the end of the thread is

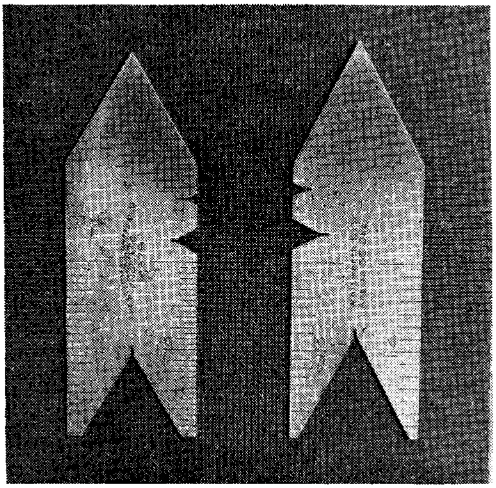


Fig. 3. Tool-setting gauges for 60-deg. and 55-deg. threads

reached and the remaining portion is then finished by pulling on the belt to turn the mandrel.

Some workers cut a short length of thread entirely in this way, but it will usually be found more satistactory to turn the lathe by means of a handle attached to the tail of the mandrel.

The handle illustrated in Fig. 4 is suitable for a small lathe and is secured in place by being screwed directly into the hollow mandrel. When using the handle for screwcutting, the rotation of the mandrel is, of course, well under control and there is no difficulty in stopping the tool at exactly the right place on the work ; furthermore, any excessive resistance to the cut can readily be detected and the tool stopped before any damage is done.

Throughout any screwcutting operation on steel, the work should be kept well supplied with cutting oil applied with a brush.

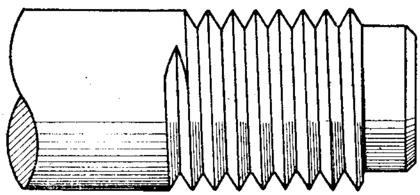


Fig. 5. Reducing the end of the work to the thread core diameter

Where the threaded component, when fitted in place, is in an inaccessible position and, in consequence, there may be difficulty in engaging its nut, it is the common practice to turn off the first two threads, as illustrated in Fig. 5. In this way, the nut is automatically centred and, when turned, will readily pick up the threads on the shaft. Similarly, if, before the screwcutting operation is started, the end of the work is reduced to the core diameter of the thread for a short distance, this plain portion will serve as a guide for cutting the thread to the correct depth. The plain part can be turned off later, if not required, and the end of the work is then chamfered in the ordinary way.

When the thread has been machined nearly to size, it is advisable to take a traverse over the work without increasing the feed of the tool, and if this is done for the final cut, the thread will be given a good finish.

Should the tool become damaged or blunted during the course of the screwcutting operation, it will have to be removed for grinding ; but, before doing this, make a note of the reading of the cross-slide index in order to ascertain the depth of the thread already cut.

After it has been resharpened, the tool is again set squarely with the aid of the gauge, and is manoeuvred to lie correctly in the thread by turning the top-slide and cross-slide feed screws.

When the cross-slide index has been reset to the previous reading, the work can be started again where it was left off.

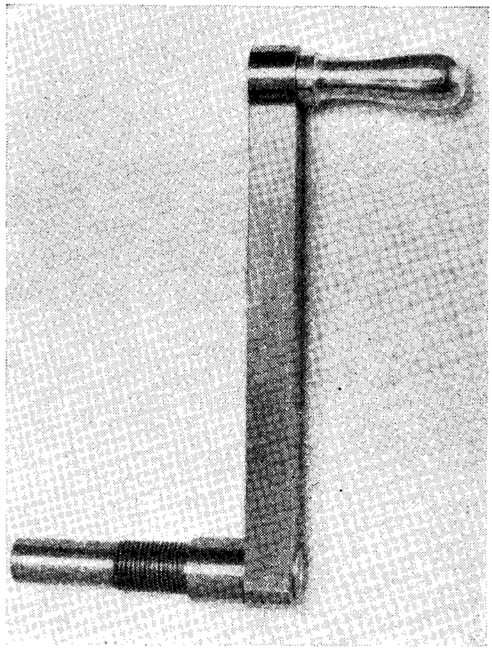


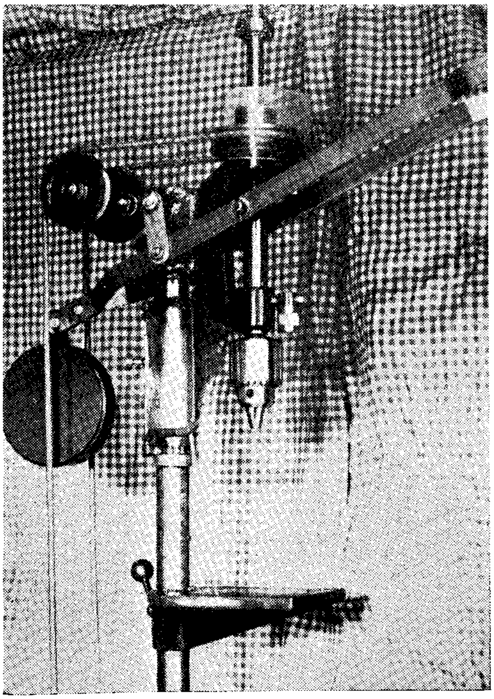
Fig. 4. A handle for attachment to the lathe mandrel

Where it is possible to select the pitch of the thread used in constructional work, it will make the screwcutting of long threads easier if a thread that is a multiple of the leadscrew thread is chosen ; that is to say, 16 t.p.i. or 24 t.p.i. with a leadscrew having 8 threads per inch. By so doing, the leadscrew clasp-nut can be disengaged and then closed at any point on the leadscrew, without reference to the thread indicator and with no danger of cutting a double thread.

A SENSITIVE DRILLING MACHINE

by L. A. WATSON

I AM submitting these few details of my new drilling machine in the hope that readers may find some points of interest in the design. It is actually a re-design of an earlier machine made in 1935 and shown in the exhibition of that year. The old machine gave good service except that the spindle drive, as originally arranged, was by 2 : 1 bevel gears obtained from a motor-car camshaft drive and (as fitted by me!) was noisy in operation. The result was that this drive was removed and an ordinary pulley and jockeys rigged up, more or less provisionally. And so, as often happens, this temporary arrangement became permanent and I therefore decided I would like to redesign the headstock which has been done in accordance with the accompanying drawings.



Showing completed machine fixed to bench. Note lower splash guard swung aside to give access to chuck; and lower lubricator

I regard a feed lever perched on top as an abomination. In the position in which I have placed it, it occasions little extra work, and as this type of feed worked well on my old machine I had no qualms about using it again. Some kind of thrust bearing is desirable in any case, and the yoke-piece which feeds the spindle downwards also houses a ball thrust. The spindle is returned to upward position by the disc-shaped counterweight shown in the photograph. I should explain that the wire cable seen dangling from the feed lever was intended to carry a balance weight below the bench, but I found that the cable would foul the small countershaft below the bench, so the weight, which was cast in lead, was hung by a single bolt in place of the cable end. My original machine had a coiled spring but the weight exercises a constant pull.

Chuck Capacity

The capacity of the Jacobs chuck is 0-⅜ in. but unless one first drills a pilot hole, drilling ⅜ in. is rather heavy work for a light machine with sensitive feed, and I find ¼ in. the largest size for ease of handling. I may be criticised for the use of a single speed pulley to the spindle, but as the countershaft and motor each have three-speed pulleys I can get the usual ranges of speed without difficulty. This method simplifies the question of jockey pulleys which, in the present case, are fixed-position and run on small ball-races. They are very quiet in operation. This is contributed to by the use of endless woven cotton belting, so avoiding that annoying "clickety-click" of metal belt fasteners.

Constructional Details

I have not given ny dimensions, but the drawings are reproduced two-thirds full size. Fig. 1 shows the headstock in part section, the bore of the upper boss being 1 in. and into which the mild-steel sleeve is a press fit. This sleeve is shown in part section in Fig. 2. It was turned from a piece of 1⅛ in. diameter B.D.M.S., a simple chuck job. It carries, also a press fit, two cast-iron bushes bored one thou. under $\frac{9}{16}$ in. to allow for lapping after pressing in. The lower boss was bored a thou. under 0.810 in., this dimension being adopted by force of circumstance; I originally intended it to be $\frac{13}{16}$ in. but I had already turned the larger end of the spindle to within a thou. of finished size, and through carelessness reduced it to $\frac{13}{16}$ in. dead which left no allowance for lapping. The spindle was made from a piece of back axle and took an excellent surface after lapping.

An Awkward Set-up

The headstock casting was rather an awkward thing to set up on the cross-slide for boring, owing to the varying diameters of its bosses. It was first drilled $\frac{1}{16}$ in. under finished size by drilling from the lathe headstock and supporting the casting in the back centre. Reference to my rough working drawings enabled me to calculate

the lengths of wood blocks required to bring each boss to lathe centre height. Two clamping bars at strategic points held all down firmly without any apparent distortion, and the boring was carried through without any difficulty by means of the usual cutter in a bar between centres. Before removing the work, the slight counterbore at the upper end of the casting was machined, this to form a seating for the narrow shoulder on the bearing sleeve. The bores for the spindle were lapped out to a mirror finish and the spindle lapped afterwards until it would just enter. Close fits such as this demand the use of fine lubricant, and I find "3-in-One" oil satisfactory.

Lubrication

Continuous lubrication is provided by means of the oil cups seen in the photograph. These have wick feeds (round lamp wick), and light springs keep the ends of the wicks against the spindle. At least, that is what happens in the lower boss, but the splined upper end of the spindle precluded contact by the wick, so in the annular space between the two cast-iron bearing bushes, I introduced a piece of felt cut from an old hat and the upper wick presses against the felt and keeps it saturated. I mentioned continuous lubrication a few sentences back. This was no understatement because these wick fed lubricators go on supplying oil whether the machine is working or standing, and in a month or so they drain the oil cups dry. However, it is better to have too much oil than not enough.

Here may I perhaps draw attention to the splash guards. Even an enclosed spindle machine will throw oil from the chuck, and a guard is well worth fitting. I arranged the lower guard on two clips so that when manipulating the chuck the guard can be swung aside. It is simply a light metal frame enclosing a thin Perspex window, and the whole thing is prevented working down the column by a brass ring which was slit to give it a springy grip on the column. The upper guard, being a slightly thicker Perspex, is largely self-supporting as regards its shape, having a metal strip along its lower edge partly to provide a means for fixing it in place. The upper lubricator clamps the guard to the boss.

To Prevent Lift

To prevent the driving pulley lifting off its seating, I adopted a system of round-ended grub-screws working in a groove in the sleeve. After the belt groove had been turned in the pulley, three equidistant holes were drilled radially to the bore of the wheel. The wheel was completely machined before the sleeve was made and while the sleeve was still in the chuck, upper end outwards, the wheel was slipped in place up to the shoulder and the position of the shallow groove marked on the sleeve by putting a scriber down one of the screw holes in the pulley. These holes carry round-ended grub-screws whose ends enter the groove in the sleeve only so far as will prevent the pulley lifting and to keep them in place, they are locked by a second set of screws. The groove is not shown in Fig. 2 because its position can only be determined after the pulley is machined. This arrangement is working very well.

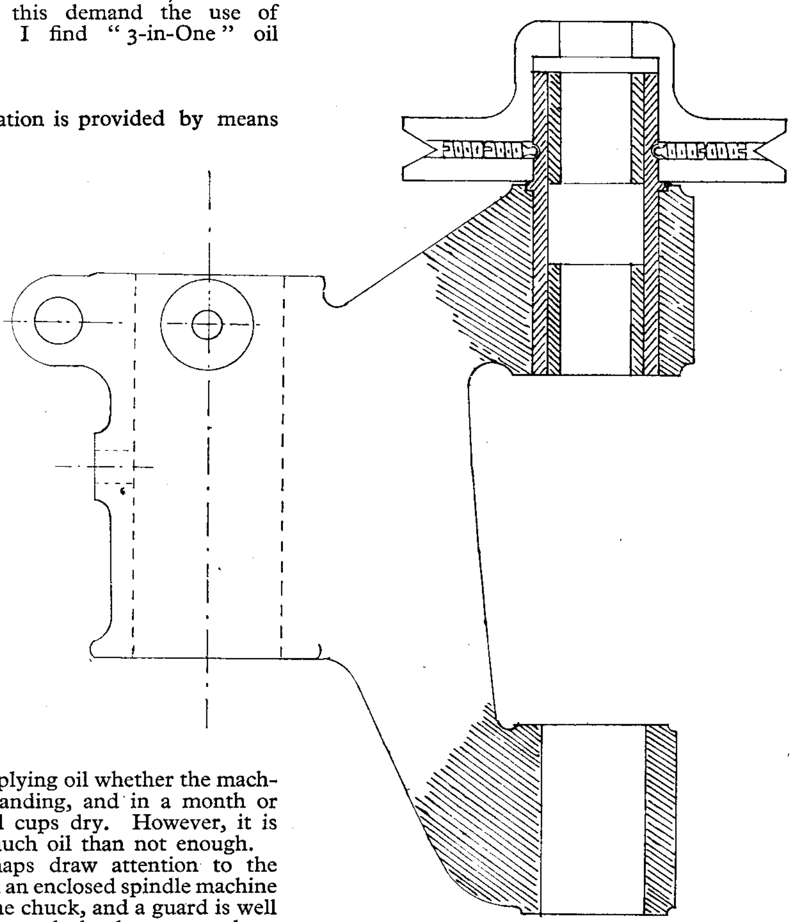


Fig. 1. Part sectional view of the headstock

The Yoke

Fig. 3 deals with the yoke which operates the spindle and contains the ball thrust. A piece

of $\frac{3}{8}$-in. bright mild-steel was used for this and after cutting and filing to shape the spigots were centre-drilled a short distance and turned to $\frac{5}{16}$ in. diameter between centres. The ball-race housing was bored out with the yoke held in the independent chuck and

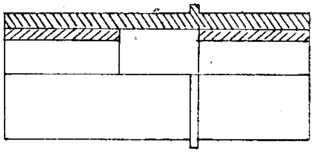
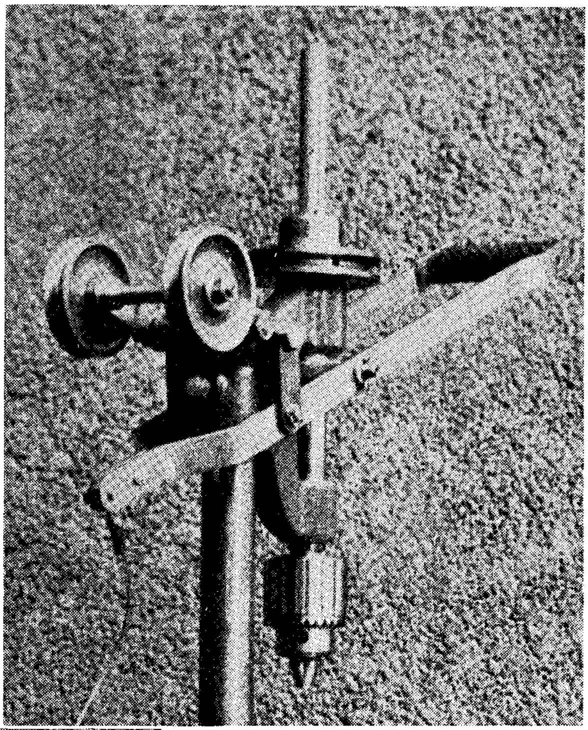
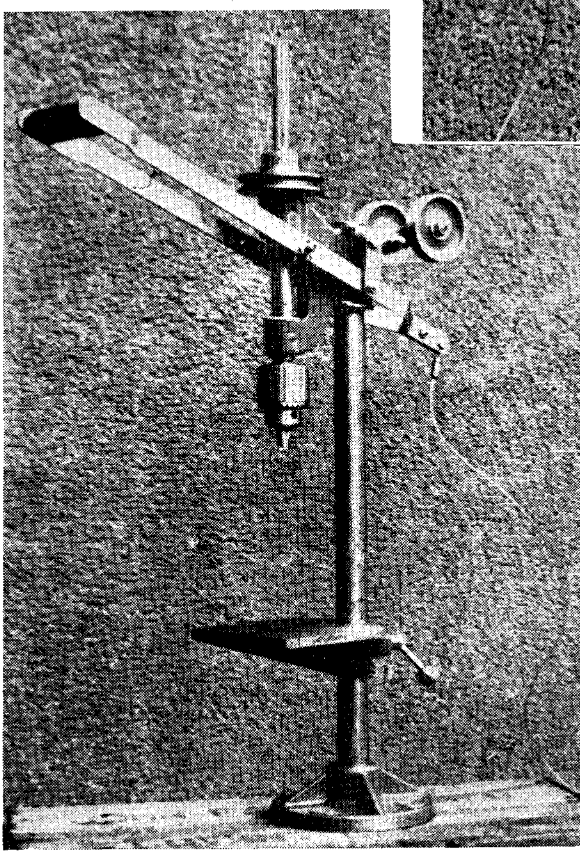


Fig. 2. Part section of the sleeve

as fine a surface as possible aimed at to facilitate lapping to a good finish after case-hardening. The finished bore is 1 5/64 in. to accommodate 23 $\frac{1}{8}$-in. diameter balls. The inner part of the race is simply a ring bored a close fit over the spindle and with its edge turned to 90 deg. included angle. This ring



Larger view of headstock and fittings. Feed lever has hardwood handle with diamond pattern saw-cuts



Assembled machine after major machining operations completed

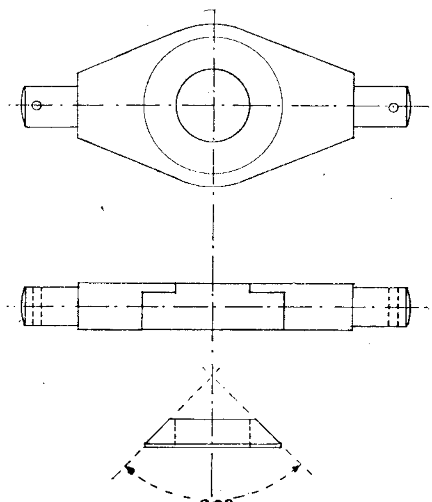
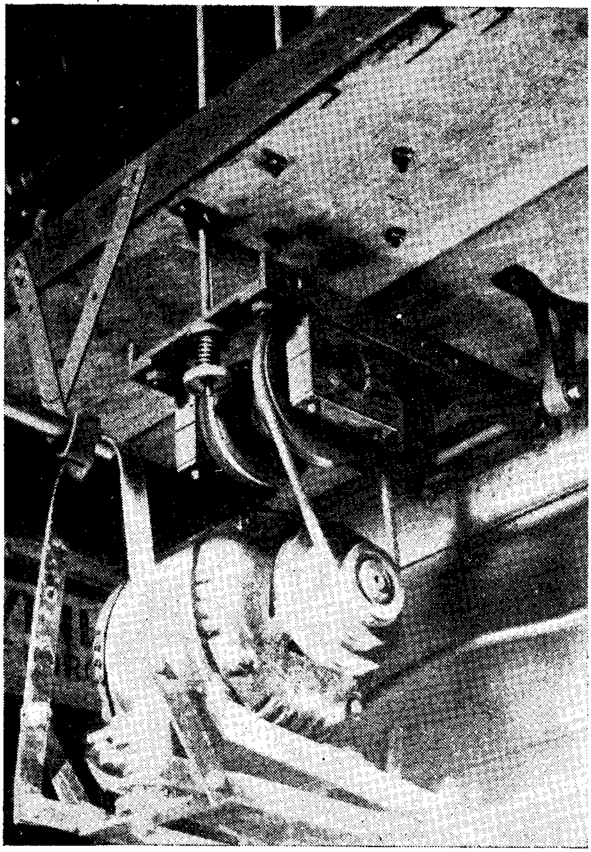


Fig. 3. Detail of the yoke

butts against the spindle shoulder and requires no fixing. It was case-hardened and the bevelled surface lapped. A phosphor-bronze collar, having two Allen type screws seating in depressions drilled in the spindle, takes the upward pull of the feed handle—and prevents the thrust bearing coming apart.

The feed lever is simply mild-steel strip $\frac{1}{8}$ in. × $\frac{3}{4}$ in. originally painted blue and obtained from the locking mechanism of a steel filing cabinet. Actually it is slightly under $\frac{1}{8}$ in. thick and at the yoke, I riveted side plates about 2 in. long to give added bearing surface for the yoke spigots and to strengthen the lever at a point where the greatest pressure is exerted when feeding the drill. The length of the arm gives a 1:3 increase in feed pressure which I find adequate—even for $\frac{3}{8}$ in. diameter holes.



View of driving arrangements underneath drill bench. Motor is fitted on a cradle hinged to a horizontal bar at rear (out of sight in this photograph). Countershaft is also hinged and weight of motor exercises constant tension on both driving belts. Out of use, motor to countershaft belt is slipped off and motor can be slid along the bar to drive the grinder at other end of bench

Castings

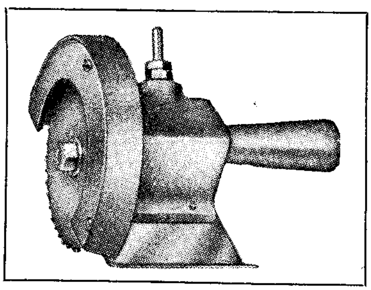
The remaining parts of the machine call for no comment except to say that the table and base were cast from the same patterns as were made for the original machine. Stuart Turner Ltd. supplied the castings, and I should here like to say what an excellent job they did. They cost under 30s. and were sandblasted which made them so much cleaner to handle than the general run of castings obtainable today. In addition, sandblasting removes much of the sandy scale which plays such havoc with one's turning tools.

If any reader desires further details I shall be pleased to furnish them and to lend the patterns, on the understanding that they will not be mutiliated in moulding.

Correspondence on these subjects should be addressed through the editor.

A Circular Saw Attachment

WE have recently received from Messrs. Kingsbourne Products Ltd., 3, Eagle Street, Holborn, London, W.C.1., particulars of their circular saw attachment, designed for use with any portable electric or pneumatic drill giving a speed of 1,200-2,800 r.p.m. It appears to be of sound design and construction and should prove useful in the home workshop where the conservance of space is an essential factor. It is simple and easy to fix, necessitating merely the insertion of the spindle in the chuck, as you would the usual drill and affixing the safety device, which allows single-handed operation of the tool.



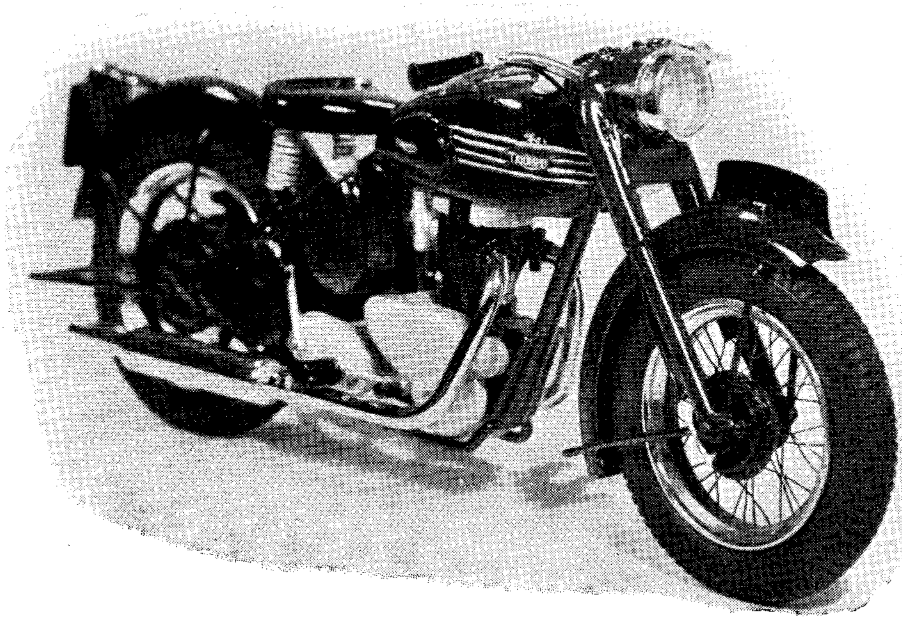
The angular drive is *via* high-grade steel gears running in self-lubricating bearings, and little maintenance is required, other than replenishing the gearbox after 25-30 sawing hours.

A 4-in. high carbon steel circular saw blade is supplied, giving a $1\frac{1}{4}$ in. depth of cut and enabling a thickness of up to $2\frac{1}{2}$ in. to be handled.

Further particulars may be obtained from the manufacturers.

A Model Triumph "Speed Twin"

by F. Surgey



HAVING considered the building of a model motor-cycle for a long time and knowing that models of this type are rather scarce, I decided to build a small non-working model of one of the popular makes. I had examined the few models that had been on show at the MODEL ENGINEER Exhibitions and was very interested in two wooden models which were entered a year or so ago.

After coming to a definite decision I talked with several motor-cycle enthusiasts and found that they had many and varied types which each thought in his own mind was the better type of machine. I further discussed this matter with a local stockist and found much the same attitude, but he presented me with a number of leaflets of different types so that I could study them and decide which to make.

I eventually decided to build the Triumph "Speed Twin" because first, this type is very popular and, secondly, the design was very suitable for reproduction in model form.

Thirdly, the illustration in the catalogue was a perfect side view and from that I managed to calculate the general dimensions for the drawings I made. The whole design was evolved round the sizes of the tyres. These tyres were of the Meccano type and measure 2¾ in. diameter with a good scale section and are very suitable for this type of work After the side view drawings were completed, work was commenced on the wheels which were a very tedious but nevertheless an interesting job.

The rims of the wheels were turned from a brass bush, care being taken to make them of correct section to fit the tyre and yet be not too heavy. Hubs were turned from brass bar, the front one with brake drum in one unit and the rear one of the correct type as in the patent springing system for this particular make of motor-cycle. These hubs were drilled for the axles of 3/32 in. diameter and carefully turned thin flanges were machined to be drilled later for spoke holes. As I had not made any wire wheels before and these being small, I naturally firstly made a jig to build the wheels upon. This simple jig was turned from a piece of mild-steel, recessed to take the rim for half its depth and drilled in the centre to take a piece of 3/32 in. steel, driven in and long enough to hold the hub. After drawing the wheels out on paper I decided that a total of 36 spokes was sufficient in each wheel. Though these are not of course the correct number, the finished appearance of these wheels is excellent. The holes were centre-punched with an automatic centre-punch, which is admirable for this type of work, and drilled with a No. 60 drill. They were drilled on a machine and not by hand and in drilling a total of 288 holes in this and the later model motor-cycle I broke only one drill.

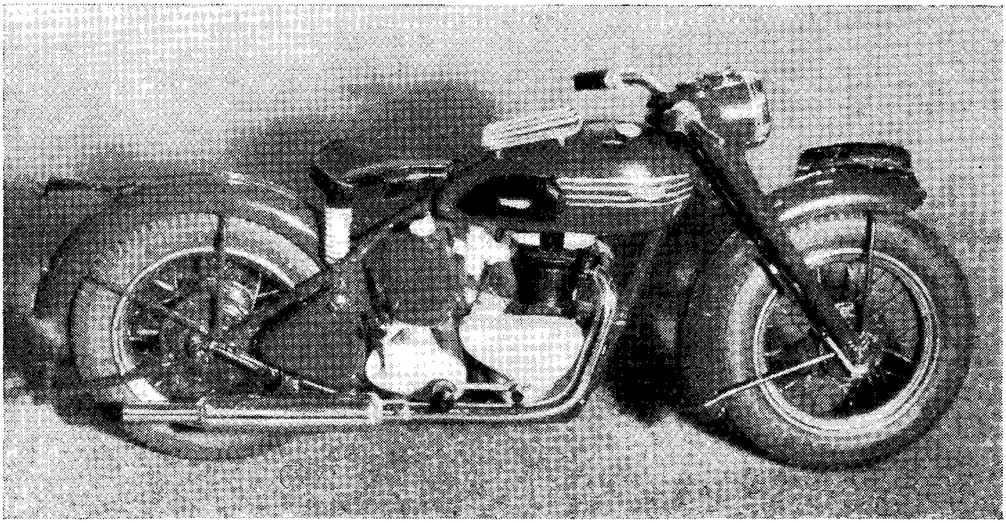
A rim and hub were set up in the jig and after spending several hours experimenting I eventually produced a wheel with spokes made of 26 s.w.g. wire. This wire was apt to break off when pulled tightly through the holes but as I got used

to threading the spokes I knew how tightly to pull and not break the wire. I jotted down the method of weaving the spokes which I had evolved and this simplified matters considerably in building up later wheels. The rims of these wheels had to be chromium plated and so I decided to take apart the wheel I had made and send the rims only as the rather fragile spokes would have interfered with the polishing operation during the chroming process. This first phase being a success I turned my attention to the other sections of the model.

The mudguards were next tackled and were turned from a piece of brass bush to the correct section, leaving a rib down the centre as in the prototype. I found that a complete circle of this section was sufficient to make both the front and rear mudguards. Number plates of sheet brass were cut and soldered to these mudguards later.

The headlamp unit was made up next from various turnings and was a very difficult job. The headlamp itself was turned and filed to shape, being drilled later to take the locating lugs of the speedo, ampmeter and switch which were machined from brass bar and soldered in position. The fork tubes were turned from brass bar and soldered to recesses filed in the headlamps sides. Underneath the headlamp and across the fork tubes a piece of brass was soldered to represent the cover for the horn as in actual practice. Slightly lower down than this the bottom bearing plate was soldered at the rear of its tubes to take the bottom end of the swivel pin on which the fork unit revolves. Holes were drilled and tapped in this unit for the handlebars which are of $\frac{1}{8}$ in. stainless steel, being bent and screwed into these later after the unit had been chromed. The lower sections of the forks were cut from $\frac{3}{16}$-in. brass bar to fit into the fork tubes, the opposite ends being filed and drilled to take the 3/32-in. axle.

The frame was built up from copper wire and brass rod together with brass sheet to represent plating on the actual bike. One of the difficult jobs on the frame was the setting and soldering of the brass sleeve through which passes the swivel pin for the front forks, but this problem was duly overcome after several attempts. At this stage the mudguards were fitted to the frame and forks and mudguard stays of copper wire were soldered in position. The rear lamp was turned and soldered to the number plate and both number plates soldered in position as previously mentioned. The rear stand was made up from brass rod and fitted to the rear forks by means of two small rivets so that the stand could be raised or lowered if required.



Side view, showing kick-start, gear-change lever, oil tank and toolbox

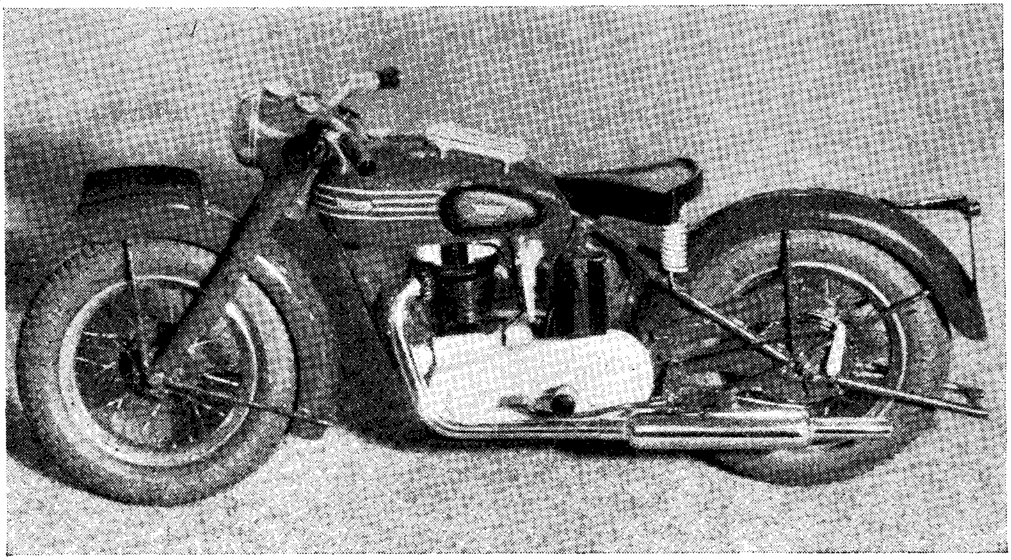
The cylinder and crankcase were turned from brass in one piece, the cylinder head and crankcase being filed and cut to shape after turning. Holes were drilled in the cylinder, which is solid, for the two plugs, the two exhaust pipes, the carburettor and the valve push rod tubes.

To the crankcase is attached on one side the chain cover for the gearbox drive and the other side the chain cover for the dynamo and magneto drive. These covers were cut from brass and were filed to shape and are bolted to the sides of the crankcase. The dynamo and magneto were turned and soldered to this particular chain cover before it was attached to the crankcase. The gear box was cut from a piece of brass and after filing the shape was bolted to the opposite side chain cover. Before this gearbox was finally fitted, holes were drilled in it for footrest, kick start, pedal and gear change pedal, the latter two holes being tapped 12-B.A.

Exhaust pipes were made from $\frac{3}{16}$-in. brass and the silencers turned and bored from brass

bar. These two sections were soldered together and then the small circular section of fins where the pipes fit into the cylinder were cut and soldered in position later. The front end of the completed pipes was fitted to holes already drilled in the cylinder and the silencer end was drilled and bolted to small strips soldered to the bottom of the rear forks specially for this purpose. These were later chromed and enhance the finished appearance of the model considerably.

Before the battery was fitted, this filter was cut from sheet tin and soldered in position. The battery made from a small block of brass, was fixed to this filter by a thin metal strap as on the real machine. On the opposite side to the battery is the oil tank, which was cut from brass, and the filler cap turned and soldered to this. The tool box, triangular in shape, is also fitted on this side and this, too, was cut from brass. Both these fittings were bolted to plates soldered to the frame for this purpose.



Side view, showing rear brake pedal and dummy chain drive, together with battery and chain case

The model was beginning to take shape by now and so I decided to make the petrol tank next. This and the seat are the only wood parts on the model. The petrol tank was cut to shape roughly and finished on a grinding wheel. The seat was made in much the same manner. Knee pads also of wood, were glued on each side of the petrol tank while ribs were formed by means of wire glued in position. The parcel rack on the top of the tank was built up from copper wire and soldered together, this also being chromed later. The filler cap was turned from brass and driven into a hole drilled for this purpose. Before screwing the petrol tank unit on to small plates soldered to the frame for this purpose, the hole was drilled for the petrol feed pipe, the pipe being a piece of copper wire and the tap being made from a 10-B.A. hexagon nut and a tiny panel pin.

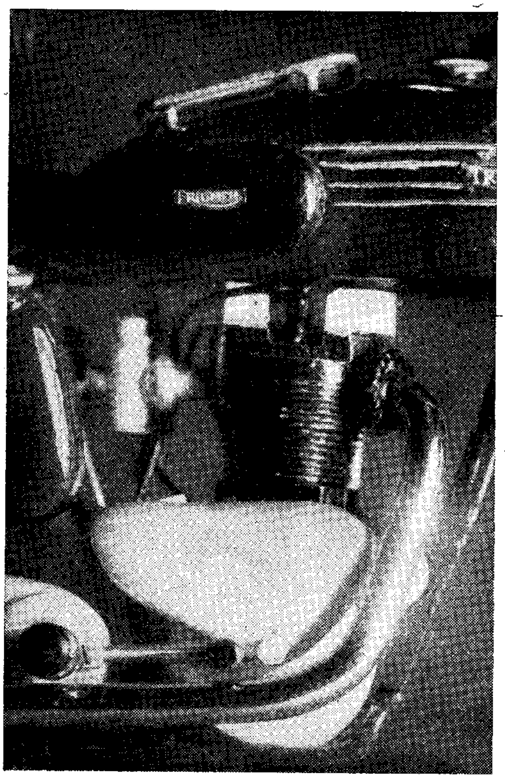
Seat springs were made from wire coiled round a length of round steel, the lower end of the spring being soldered to the frame and the upper end to a brass plate which was screwed to the underside of the seat.

The carburettor was turned in sections from small pieces of brass and soldered together, the petrol pipe being fitted into this when completed. The intake of the carburettor is coupled to a filter which is fixed at the rear of the battery.

A series of small parts were turned next for the handlebar grips, the small knob for the top of the front forks, the front hub brake drum cover, the footrests and foot pedals. Gear change and kick start pedal cranks were turned from stainless steel and bolted to the gearbox when the small pedals had been riveted to them. The brake pedal for the rear was made from copper wire and brass sheet, this same material being used for the rods and bars to couple same to the rear brake drum.

Attention was next turned to the dummy chain drive. The sprocket at the rear was turned from brass and teeth filed in this. The chain itself was a source of trouble and was finally made from copper wire filed to shape and although not able to work it looks very effective. This chain is covered by two metal covers and both these were cut from sheet tin and soldered to the rear forks after shaping. A dummy pump turned from brass is soldered to the top of the upper chain cover.

The front brake drum cover was fitted in position and the small arm cut from brass and bolted to this. Coupled to the end of this arm is the brake " cable." This was made from copper wire and runs up the side of the forks to the lever on the handlebar. There are, of course, two levers on the handlebars. One for the front brake and



Close-up view of the engine

the other for the clutch. The levers were made from stainless steel cycle spokes, small lengths being filed to shape to represent same and clamped to the handlebars by small clamps made of brass and fastened by a 14-B.A. bolt and nut. In addition to these levers is a small button to represent the horn button on the real motor-cycle mounted on the right-hand side of the handlebars.

Two tiny " plugs " were turned from brass and fitted to the holes drilled in the cylinder head, being coupled to the magneto by means of small lengths of copper wire.

The model was now ready for painting and so the model was dismantled to facilitate the easier painting of the parts. The wheels had been built up after chromium plating and so the hubs and centre sections of the rims only were painted. These are amaranth red* as is the remainder of the model save for the engine gearbox, chain-covers, seat and number plates. The cylinder pins are black. The remainder of the above parts are silver, except, of course, the number plates.

Instruments in the headlamp unit were painted black while the tiny dials were marked in white ink and look very effective. The headlamp " glass " was a wrist-watch celluloid disc.

The completed model looks fine and I am very pleased that I tackled it. The time taken to build this model was roughly three months' spare time, and after its completion several motor-cycle enthusiasts suggested I should make another model, this time the Sunbeam S.7, and as this is of slightly different design. I shall, with the editor's permission, write a short article on this at a later date.

* " Amaranth Red," is the shade of paint as supplied by Messrs. Triumph Ltd., for painting the model.

A Screwcutting Problem

by S. A. Stead

WHILE screwcutting on a lathe not fitted with a thread dial, the writer found the usual dodges of marking the change wheels and reversing the lathe by hand somewhat tedious, and analysed the situation thus ; the thread dial measures a given distance along the leadscrew and possibly a steel rule could do the same job, enabling the leadscrew to be engaged in such a way that the carriage is moved a distance representing a whole number of threads on both work and leadscrew. For an even number of threads per inch and a 4 or 8 t.p.i. leadscrew this distance is clearly a multiple of ½ in. (i.e., ½ in., 1 in., 1½ in. etc.), while for an odd thread it is a whole number of inches and for a thread such as 12½ t.p.i. it is 2 in. The following procedure, based on this analysis, was adopted and proved satisfactory :—

(1) The tool was advanced to touch the work.
(2) The cross-slide and top-slide micrometer collars were set to zero.
(3) The top-slide (set to make an angle 1 deg. less than half the included angle of the tool bit with the top-slide) was fed in to give the required depth of cut.
(4) At the end of the cut the top-slide was quickly withdrawn and the lathe stopped.
(5) A steel rule was placed on the lathe bed, touching the right-hand end of the carriage, and the distance from this to a suitable mark on the side of the tailstock casting was noted.
(6) The leadscrew nut was disengaged.
(7) The carriage was moved along sufficient distance to clear the work and to bring the cutting tool into the required position, as described above.
(8) The leadscrew was engaged and the next cut was ready to begin.

The only error likely to occur is the disengaging of the leadscrew nut before the lathe has stopped ; apart from this, the method seems foolproof.

PRACTICAL LETTERS

Appreciation

Dear Sir,—I wish to express my deep appreciation for the splendid article on the "OO" gauge Mallet locomotive by A. A. Sherwood in your magazine of December 7th, 1950. Mr. Sherwood has achieved splendid results in such a small gauge and I look forward to similar interesting models written up in your pages.

Yours faithfully,

London, W.2. C. White.

Electrified Fences

Dear Sir,—With reference to query No. 9863 in the issue of The Model Engineer dated November 2nd. Mr. W. Sutherland in his letter in the November 30th issue, refers to an apparatus he saw in America, operated by a glass tube and marble, but was unable to give any useful details, or even to explain how it worked.

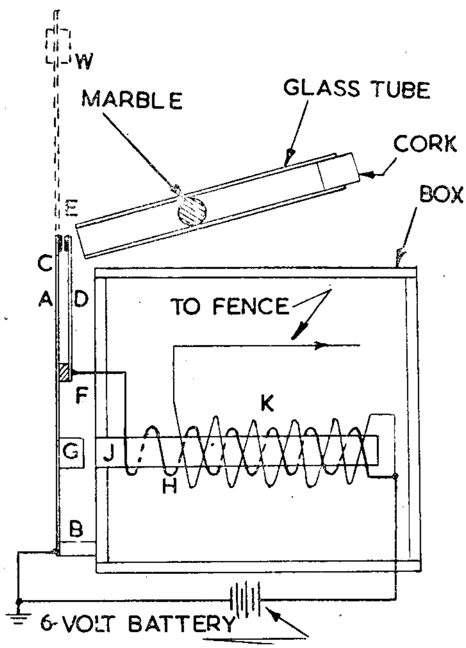
I have seen two different types of home-constructed apparatus in use. One was operated by a glass tube and marble, as mentioned by Mr. Sutherland, the other by means of a pendulum. Both work on the same principle, the basis of the apparatus being an induction coil and an interrupter gear which works at a comparatively slow speed. In all the ones I saw, an old Ford (Model T) coil was used.

The method of operation is extremely simple and can be readily followed from the rough schematic diagram herewith, which shows the glass tube and marble type. In all the apparatus I have seen, the coil is housed in a wooden box with the glass tube mounted on top at an angle of, approximately, 15 deg. to the horizontal. Provision was made for varying this angle in order to increase or decrease the rapidity of the make-and-break. The interrupter gear is fitted to one end of the box and consists of a reed *A* (similar to the clapper of an electric bell) attached to the box at *B*. At the top end of *A* is a contact *C*. Attached to *A*, but insulated from it by insulating-piece *F*, is an arm *D* carrying a contact *E*. Reed *A* is connected to the negative terminal of a six-volt batter and to earth. Arm *D* is connected to one end of the primary coil *H*. The other end of the primary is connected to the positive terminal of the battery and to one end of the secondary, the other end of the secondary being connected to the fence.

When the marble is allowed to roll down the tube it strikes contact *E*. The impact forces contact *E* against contact *C*, thus completing the circuit to the primary coil *H*. The iron core *J* becomes magnetised and draws the armature *G* towards itself with a sudden "kick." This "kick" is imparted to the marble which is driven up the tube. The contacts *C* and *E* then open, breaking the circuit to the primary coil *H* and inducing a high-tension voltage in the secondary coil *K*. This high-tension voltage is conveyed to the fence. The breaking of the primary coil circuit demagnetises the iron core *J*, and reed *A* springs back to its normal position. When the marble rolls down again the same cycle of operations takes place, and will continue until the battery runs out of juice or is switched off.

The pendulum type of apparatus is similar, except that there are no glass tube and marble. The reed *A* is extended, as shown by dotted lines on diagram, and the contact *C* mounted on the opposite side. The arm *D* is also placed on the opposite side of the reed and is mounted on a separate bracket, with an adjusting screw to vary the gap between contacts *C* and *E*. Attached to the reed extension is a small weight, *W*, which can be slid up or down and locked in any position.

To start the apparatus, the pendulum is given a preliminary flick with the finger so that contact *C* closes on contact *E*, when it will continue in



operation. The speed of the make-and-break can be regulated by sliding the weight up or down. Up slows the motion, down speeds it up.

The Ford (Model T) coil, mentioned above, is probably unobtainable in this country nowadays, and I suggest that C.E.R. should purchase a six-volt car ignition coil, which he should be able to obtain for about 12s. 6d. I could give him particulars for winding a suitable coil but, unless he has a coil-winding machine, he would find it very difficult to make a satisfactory job of it, as the secondary has several thousand turns of very fine wire.

If C.E.R. is still interested and cares to write to me c/o the "M.E.", I shall be pleased to give him any further information and assistance in designing his apparatus.

Yours faithfully,

Newcastle-on-Tyne. H. C. Maller.

Inexpensive 35 mm. Camera

DEAR SIR,—John H. Russell, like many more of us, has found it best to have a go and build his own 35 mm. camera. The writer has built one on similar lines using the G45 gun camera lens to cover the standard format 36 × 24 mm. This was achieved by using a three-hole razor blade softened over a gas flame, centre hole used as a lens stop in between lens components, this gave approximately f8. I have a 20 in. × 16 in. exhibition print enlarged from the 36 × 24 mm. negative, and camera club members have praised it for quality and definition. This experimental 35 mm. camera has been most successful.

Now I would like to point out that although the body made is quite good, I feel that I would like to place this matter before our readers as I feel sure someone would be able to *produce an alloy casting* and thus simplify construction. Many camera club men have lenses and shutters and it only requires some one to make the camera body casting to make a worthwhile 35 mm. I would be glad personally if any reader would, or could, do this for me.

Yours faithfully,
Newbury. J. CRAMB, A.R.P.S.

Small Steam Turbines

DEAR SIR,—With reference to Mr. D. H. Chaddock's steam turbine, I should like to draw his attention to the Hayward-Tyler-Terry turbine, manufactured by Messrs. Hayward-Tyler & Co. Ltd., of Luton, Beds.

This turbine has its buckets milled from the solid, but, as the steam jet is applied radially (eliminating end thrust), it might be easier to machine.

It takes steam at 450 p.s.i. with a total steam temperature of 750 deg. F., and exhausts at 35 deg. F.

The wheel is a plain steel forging, keyed to an H.T. alloy steel shaft and the steam jets are of Monel. The blade clearances are large and no fouling can occur.

It would indeed appear to be an excellent subject for the enthusiastic turbine experimenter.

Yours faithfully,
Edinburgh. W. BROWN.

"M.E." Machine Tool Tests

DEAR SIR,—Having spent nearly £30 on a planer on which the toolbox could not be raised more than 1½ in. from the table owing to the slides being out of parallel, and also requiring a new traversing gear to make it a useful tool, I decided that I would in future only buy tools that had been submitted to you for an unbiased test report. With this in view, I have contacted several makers of small milling machines and specifically stated that I am anxious to purchase and would they refer me to a test report, either by yourselves, or any journal where they have submitted their machine for examination.

In every case this part of my letter has been ignored by the seller—one only sending me a copy on an initialled testimonial from a correspondent who "purchased a machine 15 years ago which still ran very sweetly," etc. As there are many model engineers who would buy, as I shall do in future, only such machines that merit the confidence of their makers enough to allow them to be submitted to you for examination and report, I feel that such manufacturers are missing a most valuable selling point that would greatly increase their market and give confidence to the purchaser of their goods.

Possibly the publication of this letter might bring about the desired result.

Yours faithfully,
Dorset. G. E. FRITCHE.

"Fosters and Fowlers"

DEAR SIR,—Owing to the ever-present bogey many of our fraternity have constantly to confront, i.e. the lack of sufficient spare time, I regret that my reply to Mr. Blow's letter in the issue of November 30th is somewhat late.

However, the engine to which he refers is, of course, a "Foster," as may be faintly discerned upon the smokebox door nameplate in one of the photographs. This is in raised letters, as is the one upon the boiler barrel above the water tank, which is also visible in the same view.

To further "foster the idea" (with apologies to A.B.) that the engine is one of the elegant class and not belonging to the fo(u)ller type, a copy of the front nameplate is herewith reproduced.

I, too, was very surprised to read that somewhere in its travels, the "Foster" had become a "Fowler," but was not unduly worried, as I know all keen engine fans would know the difference. With all due respect to the fine "Fowler" products, this firm did turn out a number of magnificent engines in the later years. These were nicely proportioned and possessed chromium-plated fittings.

It is over a year ago since I forwarded the manuscript to the office (a token of the popularity of the "M.E." space) together with another one describing a friend's 3-in. and 4-in. scale "Fowler" engines, which I really intended to precede my own article, and the name "Fowler" must have been predominant in my mind, as I am assured by the Editor, that the error is mine. Perhaps, too, I can attach a little of the blame to the aforementioned time issue. Might as well make use of the said "gremlin."

Anyway, I offer my apologies, also heartily agree with all Mr. Blow's remarks about the various engines, and at the same time thank him for those concerning my own.

Yours faithfully,
Saltfleet. WM. T. RICHARDSON.